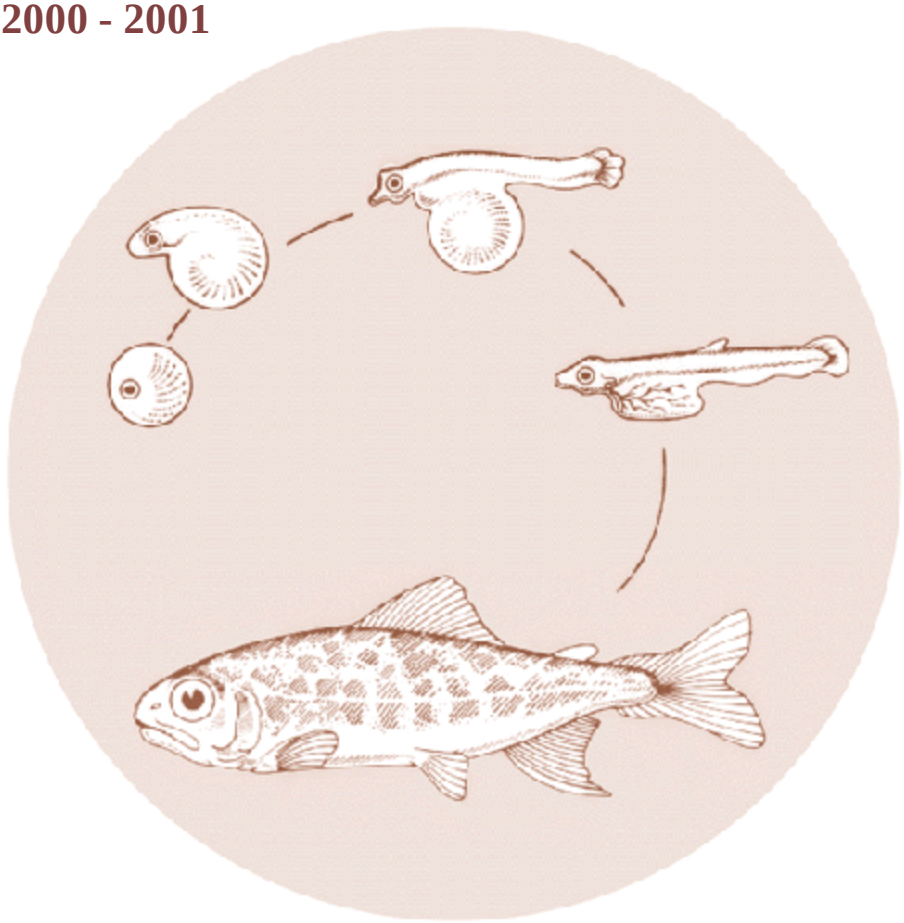
Hood River and Pelton Ladder Evaluation Studies

Annual Report
2000 - 2001



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Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

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HOOD RIVER AND PELTON LADDER EVALUATION STUDIES

ANNUAL REPORT 2000-2001

Prepared by:

Erik A. Olsen

Oregon Department of Fish and Wildlife
3406 Cherry Drive NE
Salem, Oregon 97303

Prepared for:

U.S. Department of Energy
Bonneville Power Administration
Division of Fish and Wildlife
P.O. Box 3621, Portland, OR 97208-3621

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INTRODUCTION

The Bonneville Power Administration (BPA) funded the development of two master plans which outline the rationale, and general approach, for implementing a defined group of projects that are an integral part of a comprehensive watershed goal to "Protect, enhance and restore wild and natural populations of anadromous and resident fish within the Hood River Subbasin" (Coccoli 2000; Figures 1 and 2). The Hood River Production Master Plan (O'Toole and ODFW 1991a; O'Toole and ODFW 1991b) and the Pelton Ladder Master Plan (Smith and CTWSRO 1991) were completed in 1991 and subsequently approved by the Northwest Power Planning Council in 1992. Action items identified in the two master plans, as well as in a later document entitled "Hood River/Pelton Ladder Master Agreement" (ODFW and CTWSRO Undated), are designed to achieve two biological fish objectives: 1) to increase production of wild summer and winter steelhead (*Oncorhynchus mykiss*) to levels commensurate with the subbasins current carrying capacity and 2) re-establishing a self-sustaining population of spring chinook salmon (*Oncorhynchus tshawytscha*). Numerical fish objectives for subbasin escapement, spawner escapement, and subbasin harvest are defined for each of these species in Coccoli (2000).

Several projects are presently funded by the BPA to achieve the Hood River subbasin's numerical fish objectives for summer and winter steelhead and spring chinook salmon. They include BPA project numbers 1998-021-00 (Hood River Fish Habitat), 1998-053-03 (Hood River Production Program - CTWSRO: M&E), 1998-053-07 (Parkdale Fish Facility), 1998-053-08 (Powerdale/Oak Springs O&M), and 1998-053-12 (Hood River Steelhead Genetics Study). Collectively, they are implemented under the umbrella of what has come to be defined as the Hood River Production Program (HRPP). The HRPP is jointly implemented by the Oregon Department of Fish and Wildlife (ODFW) and The Confederated Tribes of the Warm Springs Reservation of Oregon (CTWSRO).

Strategies for achieving the HRPP's biological fish objectives for the Hood River subbasin were initially devised based on various assumptions about 1) subbasin carrying capacity, 2) survival rates for selected life history stages, and 3) historic and current escapements of wild, natural, and hatchery

stocks of anadromous salmonids to the Hood River subbasin. The Oregon Department of Fish and Wildlife began funding a monitoring and evaluation (M&E) project in December 1991 to collect the quantitative biological information needed to 1) more accurately assess the validity of these assumptions and 2) evaluate the proposed hatchery supplementation component of the HRPP. Bonneville Power Administration assumed funding of the M&E project in August 1992.

The M&E project has continued to evolve since its initial inception in 1991; primarily in response to biologists requests for information critical to minimizing the HRPP's impact on indigenous populations of fish. The M&E project was initially confined (i.e., from 1991-1993) to sampling anadromous salmonids escaping to an adult trapping facility operated at Powerdale Dam; which is located at River Mile (RM) 4.5 on the mainstem of the Hood River. Stock specific life history and biological data was collected to 1) monitor subbasin spawner escapements and 2) collect pre-implementation data critical to evaluating the newly proposed HRPP's potential biological impact on indigenous populations of resident fish. The scope of the M&E project was expanded in 1994 to collect the data needed to quantify 1) subbasin smolt production and carrying capacity, 2) smolt to adult survival rates, and 3) the spatial distribution of indigenous populations of summer and winter steelhead, spring and fall chinook salmon, and coho salmon. A creel was incorporated into the M&E project in December 1996 to evaluate the HRPP with respect to its defined subbasin and spawner escapement objectives for Hood River stocks of wild and hatchery summer and winter steelhead and for natural and Deschutes stock hatchery spring chinook salmon. In 1996, the M&E project also began monitoring streamflow at various locations in the Hood River subbasin (Figure 3). Streamflow data will be used to correlate subbasin smolt production with summer streamflows.

Data collected from 1991-1999 is reported in the following annual progress reports: Olsen et al. (1994), Olsen et al. (1995), Olsen and French (1996), Olsen et al. (1996), Olsen and French (1999), and Olsen and French (2000). The annual progress reports document information collected on 1) rearing densities of indigenous fish, 2) subbasin steelhead smolt production, 3) post-release survival of acclimated and direct released hatchery summer and

winter steelhead smolts, 4) smolt to adult anadromous salmonid survival rates, 5) jack and adult anadromous salmonid escapements and harvest, 6) spatial distribution of adult anadromous salmonid holding in the Hood River subbasin, 7) selected life history patterns and morphological and meristic characteristics of wild, natural, and hatchery resident and anadromous salmonids, and 8) summer streamflows.

Data collected from the M&E project will provide the baseline information needed to 1) evaluate various management options for implementing the HRPP, 2) determine any post-project impacts the HRPP has on populations of fish indigenous to the subbasin, and 3) refine the numerical fish objectives for the Hood River subbasin. Baseline data collected to date has been used extensively to 1) provide a more biologically sound approach for developing strict race specific protocols pertaining to when, where, and how hatchery smolts are to be released into the subbasin, 2) develop strict race specific guidelines for collecting summer and winter steelhead for hatchery broodstock, 3) develop strict race specific guidelines for passing hatchery summer and winter steelhead above Powerdale Dam, 4) begin evaluating the HRPP relative to the programs performance goals and objectives (Coccoli 2000), and 5) modify the numerical fish objectives for the HRPP's hatchery supplementation program. Information was also used in the preparation of an Environmental Impact Statement (EIS; Bonneville Power Administration 1996a; Bonneville Power Administration 1996b). The EIS was completed in 1997. The Bonneville Power Administration (BPA) prepared the EIS in compliance with federal guidelines established in the National Environmental Policy Act (NEPA).

The contract periods for fiscal year (FY) 2000 and FY 2001 are 1 October 1999 through 30 September 2000 and 1 October 2000 through 30 September 2001, respectively. Work implemented in FY's 2000 and 2001 include: 1) estimating steelhead smolt production at selected sites in the Hood River subbasin, 2) monitoring selected life history, morphometric, and meristic characteristics of wild, natural, and hatchery stocks of anadromous salmonids escaping to the Hood River subbasin, 3) estimating harvest and escapements of wild, natural and hatchery stocks of anadromous salmonids escaping to the Hood

River subbasin, 4) monitoring streamflow at selected sites in the Hood River subbasin, and 5) preparing an annual progress report that summarizes data collected through FY 2001.

METHODS

Juvenile Production

Downstream migrant anadromous salmonids were trapped at rotary-screw traps (i.e., migrant trap) located in the mainstem Hood River (RM 4.5); in the West (RM 4.0), Middle (RM 1.3), and East (RM 1.0) forks of the Hood River; and in Lake Branch (RM 0.1) and Green Point Creek (RM 0.1), which are tributaries to the West Fork of the Hood River (Figure 3). Migrant traps were located at sites that would maximize both the flow into the trap and the amount of stream the trap would fish. Because of seasonal variation in streamflow, traps were periodically repositioned in the stream channel in order to optimize trapping efficiency. Migrant traps were fished seven days a week with the following two exceptions: 1) migrant traps located in the West, Middle, and East forks of the Hood River were pulled for 2-5 days following the two primary releases of each production group of hatchery salmon and steelhead smolts and 2) migrant traps subject to high flow events were pulled for 1-3 days following the event. The mainstem migrant trap fished to a maximum depth of 1.2 meters. Migrant traps in the West, Middle, and East forks of the Hood River, Lake Branch, and Green Point Creek fished to a maximum depth of 0.8 meters. The migrant traps fished approximately 8%, 9%, 14%, 16%, 20%, and 30% of the stream channels width in the mainstem, West Fork (WFk), East Fork (EFk), Middle Fork (MFk), Lake Branch, and Green Point Creek, respectively.

The rotary-screw traps funneled downstream migrants into a live box that was sampled on a daily basis. Sampling was usually conducted in the morning to reduce temperature related stress. All fish were anesthetized with MS 222 (Tricaine Methanesulfonate), sorted by species, examined for fin and maxillary mark combinations, and counted. Counts of downstream migrant rainbow-steelhead (rb-st), cutthroat trout, and bull trout were made for two size categories; they included fish greater than or equal to 150 mm fork length and fish less than 150 mm fork length. Counts of downstream migrant

juvenile wild chinook and coho salmon were made for three size categories. They were 1) fish less than 50 mm fork length, 2) fish 50-69 mm fork length, and 3) fish greater than 69 mm fork length. A random sample of downstream migrant salmonids were sampled for scales (i.e., wild salmonids only), measured to the nearest millimeter fork length, and weighed to the nearest 0.1 gram. Scale samples were mounted on glass slides and sent to the ODFW's research laboratory in Corvallis, Oregon. Experienced ODFW staff analyzed the scale samples and determined freshwater age using methods described by Borgerson (1992). Data was recorded on a computerized data entry form and keypunched into a computer database.

Downstream migrant salmonids were sampled at the mainstem migrant trap to estimate numbers of outmigrant rb-st and to monitor the temporal distribution of both the pre-smolt and smolt salmonid migration from the Hood River subbasin. Estimates of migration timing were based on bi-weekly counts at the migrant trap. Bi-weekly counts were not adjusted for seasonal variation in trap efficiency because recapture rates were typically to low to accurately estimate trap efficiency for all unique time periods sampled when smolts were migrating through the Hood River subbasin.

Rainbow-steelhead were used to indirectly estimate steelhead smolt migration timing because no accurate methodology exists to visually identify rainbow trout from downstream migrant steelhead smolts. To estimate migration timing for steelhead smolts, it was also necessary to define a cutoff date in which the majority of smolts should have migrated past the trapping facilities. Based on the distribution of bi-weekly catches of migrant rb-st, the ending date for the steelhead smolt migration was fixed at 31 July.

No accurate methodology exists to visually identify downstream migrant rb-st as either steelhead smolts, steelhead pre-smolt migrants, or resident rainbow trout. Consequently, it is difficult at this time to develop a statistical estimate of smolt production for the Hood River subbasin. Subbasin smolt production was estimated by applying a pre-defined size break to the statistical estimate of out-migrant rb-st. Migrants less than or equal to 165 mm fork length were assumed to be out-migrant rainbow trout or pre-smolt steelhead and migrants greater than 165 mm fork length were assumed

to be out-migrant steelhead smolts. The size break was developed based on information available from adult scale analysis (*see* **ADULT SUMMER STEELHEAD**, **Age Composition, Size, and Sex Ratio**; **ADULT WINTER STEELHEAD**, **Age Composition, Size, and Sex Ratio**) and age specific length frequency of downstream migrant rb-st (*see* **JUVENILE RAINBOW-STEELHEAD**, **Size and Weight**). No freshwater age-0 migrant rb-st were classified as steelhead smolts based on the fact that a sub-yearling smolt life history pattern has never been detected on scale samples collected from adult steelhead escaping to the Hood River subbasin.

The 165 mm size break was established based on three primary assumptions: 1) that most freshwater age-3 migrants are steelhead smolts; 2) that physiological changes associated with the smolting process are, in part, initiated by size; 3) that the size range of freshwater age-3 migrant rb-st in the sample population is an indicator of the size range of downstream migrant steelhead smolts; and 4) a small percentage of freshwater age 3 migrants probably rear for an additional year in the lower 4.5 miles of the Hood River subbasin, or in the mainstem of the Columbia River, prior to migrating as freshwater age 4 smolts. The 165 mm fork length size break was defined based on the minimum size of age-3 rb-st collected at the mainstem migrant trap in 1994. The smallest migrant, collected at the mainstem migrant trap in 1994, was 168 mm fork length. The size range observed in 1994 was used to develop the hypothetical size break at which smoltification occurs, rather than the size ranges observed in subsequent years, because it provides the basis for adjusting the age-3 category to account for the small percentage of this age category which may migrate past the mainstem migrant trap as pre-smolts. This adjustment is made based on the fact that a small percentage of wild adult steelhead have a freshwater age-4 life history pattern (*see* **ADULT SUMMER STEELHEAD**, **Age Composition, Size, and Sex Ratio** and **ADULT WINTER STEELHEAD**, **Age Composition, Size, and Sex Ratio**). All age-4 migrants are assumed to be steelhead smolts.

The percentage of migrants less than or equal to 165 mm fork length averaged 39% and ranged from 0-100% for freshwater age 1 migrants, averaged 20% and ranged from 15-28% for freshwater age 2 migrants, and averaged 9% and ranged from 0-18% for freshwater age 3 migrants; for migrants collected at the mainstem migrant trap during the 1994-2001 sampling seasons (unpublished data

on 7/13/2003 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon). Numbers of steelhead migrating as freshwater age-1, age-2, and age 3 smolts were estimated by adjusting the number of out-migrant rb-st by the percentage of migrants estimated to be in the larger size range for the corresponding age category.

Mark:recapture methodologies were used to estimate numbers of wild, natural, and hatchery produced anadromous salmonid smolts migrating past each downstream migrant trap. Estimates of smolt production for wild and naturally produced salmonids were limited to the upper size category (i.e., greater than 69 mm for salmon and greater than or equal to 150 mm for steelhead) because outmigrant smolts are believed to predominately be the larger size fish. A pooled Petersen estimate with Chapman's modification (Ricker 1975) was used to estimate numbers of downstream migrants, by species and size category, as follows:

$$\hat{N} = \frac{(M+1)(C+1)}{(R+1)}$$

where

$\hat{N}$ = estimated number of downstream migrants passing the rotary-screw trap,
M = number of migrants marked and released above the rotary-screw trap,
C = total number of unmarked and marked migrants captured at the rotary-screw trap, and
R = number of marked migrants recaptured at the rotary-screw trap.

Approximate 95% confidence intervals (C.I.) were calculated as follows (Seber 1973, cited by Lindsay et al. 1986; Ott 1977, cited by Lindsay et al. 1986):

$$95\%\ C.I. = \hat{N} \pm 2\sqrt{\hat{V}(\hat{N})} \quad \textit{and}$$

$$\hat{V}(\hat{N}) = \left(\frac{M^2\ B^2}{R^4}\right) R \left(1-\frac{R}{M}\right) + \left(\frac{M^2}{R^2}\right) B \left(1-\frac{B}{\hat{N}-M}\right)$$

where

$\hat{V}(\hat{N})$ = variance of estimated migrant abundance and

B = number of unmarked migrants in the recapture sample (C-R).

Downstream migrants were marked with a panjet needle-less injector; except in 1994 when migrants caught at the mainstem migrant trap were marked with a top caudal fin clip and migrants caught at migrant traps located in the East and West forks of the Hood River were marked with a bottom caudal fin clip. The panjet was used to shoot a narrow high speed stream of colored dye at selected fins. This process permanently marked the fin with a unique color by infusing a small amount of the colored dye below the epidermal layer. The dye color was changed every two weeks to uniquely mark fish for defined time intervals during the sampling period. Additionally, a small piece of either the top or bottom lobe of the caudal fin was removed from fish sampled at the mainstem migrant trap. This unique mark was applied to fish sampled at the mainstem migrant trap to 1) facilitate the identification of fish marked at the mainstem trap from those marked at all the other traps, and 2) provide an additional means for identifying fish marked at the mainstem migrant trap in cases where a poorly applied color mark was not readily visible. Unique dye color and marked fin combinations were also assigned to each trap so that the origin of recaptures at the mainstem migrant trap could be determined.

Season totals of M, C, and R were used to estimate the number of downstream migrants passing each trap; with the exception of estimates of wild rb-st and hatchery migrants passing the mainstem migrant trap in 1995 and wild rb-st migrants passing the mainstem migrant trap in 2001. Sampling periods in both 1995 and 2001 were broken up into irregularly defined time periods and the corresponding values of M, C, and R were used to estimate the number of downstream migrant wild rb-st passing the migrant trap for each of the time periods. Estimates for each time period were then summed to estimate the season total. We used this methodology in 1995 and 2001 because trapping efficiencies were low in both years, and the revised methodology appeared to more accurately estimate numbers of downstream migrants at the lower trapping efficiencies. This hypothesis is supported by the relationship between the

wild and hatchery smolt to adult survival rates (*see* **HATCHERY PRODUCTION, Post-Release Survival**) and the relationship between summer low flow and subbasin smolt production (unpublished data on 7/9/2003 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon). Race specific estimates of hatchery summer and winter steelhead smolts passing the mainstem migrant trap in 1995 were based on the mark and recapture rates associated with downstream migrant wild rb-st.

The revised methodology was also used to estimate the number of downstream migrant rb-st passing the mainstem migrant trap in 1994, 1996-1997, and 1999-2000. Estimates derived from the revised methodology were compared with estimates derived from the standard methodology to determine if the two methodologies produced significantly different results. Estimated numbers of downstream migrant rb-st derived from the revised methodology ranged from -3.7% to +4.7% of the estimates derived from the standard methodology (unpublished data on 7/9/2003 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon). The higher recapture rates obtained in 1994, 1996-1997, and 1999-2000 (Appendix Table A-1) are believed to be the primary factor contributing to the minimal difference in the estimates derived from each methodology. The only exception occurred in 1998 when the recapture rate (i.e., trapping efficiency) for the sampling season was 4.4%, and we had the second highest number of total recaptures for all years of record (Appendix Table A-1). The revised methodology increased the 1998 estimate of wild downstream migrant rb-st passing the mainstem migrant trap by 12%. We do not believe, however, that the alternative methodology accurately estimates downstream migrant rb-st in 1998 because as the number of recaptures increases, there is a significant increase in the number of marked fish that are recovered 2-5 weeks after having been marked. This makes it difficult to divide the sampling season into defined time periods when uniquely marked juveniles, and the corresponding recaptures, can both be recovered in the same defined time period. This problem generally appears to create a situation whereby the revised methodology may tend to inflate the estimate of downstream migrants.

Race specific estimates of steelhead smolt production, by year of migration as smolts, were determined using the following formula:

$$S_r = \sum_{j=1}^{FW} \left[R_j \Big/ \left(\frac{\sum_{i=1}^{SW} A_{ij}}{P_j} \right) \right]$$

where,

r = race of steelhead (i.e., summer or winter steelhead).
FW = Total number of juvenile freshwater age categories.
SW = Total number of adult saltwater age categories.
R_j = Race specific adult returns for the j^{th} freshwater age category.
A_{ij} = Total adult steelhead returns for the i^{th} saltwater age category and the j^{th} freshwater age category.
P_j = Subbasin steelhead smolt production estimated for the j^{th} freshwater age category.
S_r = Smolt production for race of steelhead (r).

Adult Trapping

An upstream migrant adult fish trap (Powerdale Dam trap) was installed at Powerdale Dam in December 1991. Powerdale Dam, which is owned and operated by PacifiCorp, is located at RM 4.5 in the mainstem Hood River (Figure 1). The Powerdale Dam trap was installed in the uppermost pool of an existing fish ladder located on the east bank of the mainstem Hood River. The stop-log water intake control of the fish ladder was modified to allow water to flow through a submerged orifice into the ladder. A removable bar grate with one inch spaces between bars blocked the submerged orifice to prevent fish from exiting the top pool of the ladder. A fyke, installed at the entrance to the uppermost pool, prevented fish from backing down the ladder after they entered

the uppermost pool. A wood slat cover was put on the trap to prevent fish from jumping out of the trap, and a lock on the cover prevented poaching. A false floor of wood slats was installed at the bottom of the trap to reduce the depth of the trap from about 4.5 feet to about 2 feet. This modification facilitated removal of the fish. In June 1992, the submerged fyke was replaced with a finger weir because it was observed that spring chinook salmon would avoid swimming through the submerged fyke and would often try to jump over it. There was no delay in migration timing, or other abnormal fish behavior, observed with the new design.

Beginning in late 1995, and continuing through early 1997, a new trapping facility was constructed at Powerdale Dam. The new trapping facility utilized the existing fish ladder on the east bank of Powerdale Dam to divert upstream migrant jack and adult salmonids into a temporary holding area where they could be crowded into a fish lock and elevated into the working area of the trapping facility. In the working area of the trapping facility, fish are transitioned from the fish lock to a staging tank; from the staging tank to an anesthetic tank; and from the anesthetic tank to the sampling area. A network of tubes, located in the sampling area, are used to transfer fish from the working area to either 1) the adult holding pens (primarily used for holding hatchery broodstock); 2) the mainstem Hood River above Powerdale Dam; or 3) a portable fish liberation tank for transport and release in either the mainstem of the Hood River (RM 0.1), Taylor Lake, or Kingsley Reservoir. Taylor Lake drains into the mainstem Columbia River (RM 186.1) near the city of The Dalles, Oregon. Kingsley Reservoir (i.e., Green Point upper reservoir) is located at the head of Ditch Creek; which is a tributary to the mainstem of the Hood River. Prior to transfer, all jack and adult salmonids are tagged with a uniquely numbered floy tag which is inserted below the base of the dorsal fin. Mini-jack spring chinook salmon are either 1) tagged with an unmarked colored floy tag and passed above Powerdale Dam or 2) killed for the coded wire tag.

The disposition of jack and adult salmonids, that are released back into the Hood River subbasin, is determined for each species and race of salmonid based on both the stock of origin and the salmonids fin and maxillary mark combination. Unmarked adult steelhead are passed above Powerdale Dam except

when they are 1) collected for hatchery broodstock or 2) have a highly deformed dorsal fin. Adults with a highly deformed dorsal fin are assumed to be an unmarked hatchery adult and are transported to the mouth of the Hood River where they are released into the mainstem of the Hood River at RM 0.1. Wild steelhead collected for hatchery broodstock are released back into the mainstem of the Hood River after they are spawned, or when they are no longer needed for hatchery broodstock. Males collected for hatchery broodstock are transferred to the Powerdale Dam trapping facility where they are passed above Powerdale Dam. Females collected for hatchery broodstock are transferred to the Powerdale Dam trapping facility where they are passed above Powerdale Dam if 1) they are not used for hatchery broodstock, 2) retain more than 10-20% of their eggs subsequent to spawning, or 3) are only partially spawned. Females are released at RM 0.1 in the mainstem of the Hood River if they retain less than 10-20% of their eggs subsequent to spawning.

Unmarked steelhead collected for hatchery broodstock, and subsequently classified as a hatchery fish based on scale analysis, are either killed or released at RM 0.1 in the mainstem of the Hood River. Non-indigenous stocks of hatchery adult steelhead are transported for release at RM 0.1 in the mainstem of the Hood River. Hood River stock hatchery adult winter steelhead are passed above Powerdale Dam in numbers not to exceed a 50:50 ratio between the wild and Hood River stock hatchery components of the winter run.

The Hood River stock hatchery summer steelhead program was first implemented beginning with the collection of hatchery broodstock from the 1997-1998 run year (1998 brood). Progeny of the 1998 brood first returned to the Powerdale Dam trap as 1 salt adults in the 2000-2001 run year. Hatchery guidelines regulate the number of Hood River stock hatchery adult summer steelhead that can be passed above Powerdale Dam prior to the 2003-2004 run year. Guidelines were designed to 1) remove 1998 brood hatchery adults from the hatchery component of the run passed above Powerdale Dam and 2) regulate the number of 1999-2000 brood hatchery adults that are passed above Powerdale Dam in the 2001-2002 through 2002-2003 run years. Progeny of the 1998 brood are not allowed above Powerdale Dam because they are deemed to be genetically unfit (*see* **HATCHERY PRODUCTION**, **Broodstock Collection**). The number of hatchery adults passed above Powerdale Dam in the 2000-2001 run year was

restricted in order to prevent the HRPP from swamping the 2002 brood wild population with a hatchery run comprised of a single saltwater age category (i.e., 1999 brood 1 salt hatchery adults). The number of hatchery adults passed above Powerdale Dam in the 2001-2002 run year was regulated to randomly pass 1 salt (2000 brood) and 2 salt (1999 brood) hatchery adults above Powerdale Dam in numbers not to exceed a 50:50 ratio between the wild and Hood River stock hatchery components of the summer run. Hood River stock hatchery adult summer steelhead that are passed above Powerdale Dam will be randomly selected from throughout the entire hatchery component of the run beginning with the 2003-2004 run year.

The wild:hatchery adult steelhead ratio that will be maintained above Powerdale Dam is currently being debated for summer steelhead. One proposal is to maintain a 20:80 ratio between the wild and Hood River stock hatchery components of the run. This has come to be defined as the "boost" strategy for restoring the wild summer steelhead run to levels commensurate with the subbasins current carrying capacity. The 20:80 ratio between wild and Hood River stock hatchery components of the run would be maintained for three consecutive run years, after which time the HRPP would then maintain a 50:50 ratio between wild and Hood River stock hatchery components of the summer steelhead run passed above Powerdale Dam.

It is unknown at this time when, or even if, the proposed boost strategy will be implemented in the Hood River subbasin. Escapements of wild summer steelhead have gradually increased over the last several years; which would suggest that the proposed boost strategy, or some variant of the boost strategy, is probably unnecessary for achieving the Hood River subbasins numerical fish objectives for wild summer steelhead. The existing protocol at the Powerdale Dam trap is to maintain a 50:50 ratio between wild and Hood River stock hatchery components of the summer steelhead run passed above Powerdale Dam. The boost strategy would then remain as one option for increasing wild summer steelhead production if escapements again appear to be on the decline.

All unmarked and marked spring chinook salmon are passed above Powerdale Dam; with the exception of those jack and adult fish collected for hatchery

broodstock. Unmarked and marked (stray) fall chinook and coho salmon were passed above Powerdale Dam through the 2000 run year. The HRPP discontinued passing marked (stray) fall chinook and coho salmon above Powerdale Dam beginning with the 2001 run year.

Virtually all hatchery jack and adult salmonids that are either 1) not passed above Powerdale Dam, 2) collected for broodstock, or 3) sacrificed for a coded wire tag are transported for release at RM 0.1 in the mainstem of the Hood River; with the exception of a small number of hatchery summer and winter steelhead that were transported for release into Taylor Lake and Kingsley Reservoir. Hatchery salmonids are released at the mouth of the Hood River based on the assumption that they will return to the Powerdale Dam trap, and in so doing will again be subject to sport and tribal fisheries located below Powerdale Dam. Adult salmonids that are caught at Powerdale Dam, hauled back to the mouth of the Hood River, and then released at RM 0.1 in the mainstem of the Hood River are classified as "recycled" fish. Tagged hatchery salmonids recaptured at the Powerdale Dam trap may be recycled through the fishery multiple times in order to further increase harvest opportunities in the subbasin.

The Powerdale Dam trap was checked on a daily basis from December 1991 through January 1997, except during the winter when low stream temperatures typically slow the upstream migration of jack and adult salmonids. The new trapping facility at Powerdale Dam, which came on line in February 1997, was checked every one to three days depending on the number of jack and adult salmonids escaping to the facility. The flexibility to sample the new trapping facility at a lower rate was made possible by the facilities increased adult holding capacity. Generally, the trap was checked in the morning in order to minimize the potential handling stress that is associated with sampling fish during the afternoon, when water temperatures are typically higher. Prior to handling, all fish were tranquilized in a holding tank charged with CO_2.

Jack and adult salmonids were identified by species, classified by sex, and examined for injuries. Injuries were categorized as either a predator scar, net mark, hook scar, or a scrape. Predator scars include both closed

and open wounds. A closed wound is typically an "M" shaped marine mammal scar where scales are missing and the skin is scratched. An open wound is one in which the skin is broken. Net marks are distinguished by a raw, rubbed mark on the leading edge of the dorsal fin. Generally, marks from the net twine can be seen encircling the fish. Hook scars include both fresh and healed wounds. Fresh hook scars were identified by either torn or abraded skin in the area of the mouth. Healed hook scars were typically identified by a missing maxillary or deformed jaw. A wound was classified as a scrape if the wound did not appear to be the result of a predator and the skin was either 1) scratched or abraded or 2) the scales were missing.

Summer and winter races of steelhead were distinguished based on fin and maxillary mark combinations, external coloration, degree of scale tightness and scale erosion, state of sexual maturity relative to the time of year, external parasite load, color of gill filaments, and general appearance. Spring and fall races of chinook salmon were distinguished based on run timing, external coloration, and general appearance. Subsequent to the physical examination, virtually all jack and adult salmonids were measured to the nearest 0.5 cm fork length and a random sample were weighed to the nearest 0.1 kg. All field data was entered on a computer form and keypunched into a database.

Fecundity was estimated for wild and hatchery summer and winter steelhead adults used as hatchery broodstock. Females used for hatchery broodstock were air spawned and the number of eggs per female was estimated with a volumetric displacement technique. The fecundity estimate for a given female was not incorporated into the sample population if it appeared that the female retained more than 5-10% of her eggs. Estimates were not adjusted to account for potential egg retention.

Scale samples were collected from virtually all jack and adult salmonids sampled at the Powerdale Dam trap. Samples were collected from the key scale area, which is located above the lateral line behind the posterior end of the dorsal fin. Scales were collected from one, or both, sides of the fish and placed into uniquely numbered scale envelopes. Scale samples were later mounted on gummed cards and sent to ODFW's research laboratory in

Corvallis, Oregon; where acetate impressions were made of the scale samples. Experienced ODFW staff viewed the scale impressions under a microfiche to determine both the origin (wild or hatchery) and freshwater/ocean age category of each jack and adult salmonid in the scale sample. Scales were analyzed using methods described in Borgerson (1992).

Summer and winter races of adult steelhead were classified as either a wild, subbasin hatchery, or stray hatchery adult based on 1) the fin and maxillary clip combination (mark combination) and 2) scale analysis. Scale analysis was used to determine if an unmarked adult was either a wild or hatchery produced fish. Unmarked wild adult summer and winter steelhead were assumed to be the progeny of wild production in the Hood River subbasin. Unmarked hatchery adult summer and winter steelhead were assumed to be the mis-marked progeny of subbasin hatchery production releases in the Hood River subbasin. The number of unmarked hatchery adult summer and winter steelhead sampled in the Hood River subbasin is typically low. This is based on the fact that 100% of both hatchery summer and winter steelhead production groups are marked prior to release. The only exception being that Big Creek stock production groups were released unmarked, prior to the 1989 brood release (*see* **HATCHERY PRODUCTION**). Progeny of unmarked Big Creek stock brood releases returned in the 1990-1991 and 1991-1992 run years.

Marked adult summer and winter steelhead were classified as progeny of Hood River stock production releases if the identifying mark combination was valid for the corresponding brood year of release (*see* **HATCHERY PRODUCTION, Production Releases**). Marked adult summer and winter steelhead were classified as stray fish if the mark combination was valid for a Hood River stock production release, but invalid for the corresponding brood year of release. In both cases, the brood year of release was determined from scale analysis. Marked adult summer and winter steelhead were assumed to be progeny of a Hood River stock production release if the age of the adult could not be determined, but the identifying mark combination was valid for a Hood River production release. This occurred in the very rare circumstance when either 1) no scales were collected from an adult or 2) all the scales collected from an adult were regenerated. Adult summer steelhead marked with a single adipose clip were assumed to be the progeny of Skamania stock production

releases in the Hood River subbasin. Marked adult summer and winter steelhead were classified as stray adults if they bore a mark combination that did not correspond to a combination released in the Hood River subbasin; with one exception. Winter steelhead with either an adipose or ventral only fin clip were assumed to be progeny of a Hood River production release. This exception was adopted because of the high mis-mark rate observed in bio-samples collected from the hatchery production group prior to transfer to acclimation sites in the Hood River subbasin.

Scale analysis identified a number of unmarked steelhead as hatchery fish and marked steelhead as wild fish (i.e., origin unknown). The latter group includes marked wild and natural strays and Hood River stock wild steelhead which either had deformed fins or had the fins removed by sport fishers. Fin removal, by fishers, has been observed in the Hood River subbasin (personal communication on 11/17/1993 with Jim Newton, ODFW, Mid-Columbia District, The Dalles, Oregon; unpublished data on 1/7/2003 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon). The former group includes steelhead that were either mis-classified as hatchery fish or were unmarked hatchery fish. Unmarked hatchery steelhead are believed to primarily be progeny of subbasin hatchery production releases because of problems associated with poor marking of hatchery smolts; a problem primarily associated with the hatchery winter steelhead program. Numbers of adult steelhead in either of the two above groups was typically low.

Migration timing, sex ratio, and age structure was estimated from only those adult steelhead in which scale analysis classified the origin of an unmarked adult as wild and a marked adult as hatchery. Freshwater/ocean age category and mark combination was then used to classify a marked adult steelhead as either a subbasin or stray hatchery produced steelhead. The above protocol was designed to minimize the potential for biasing stock and race specific estimates for populations of wild and hatchery adult steelhead in the Hood River subbasin.

Unmarked "hatchery" adults and marked "wild" adults were summarized as subbasin hatchery or wild adults, respectively, for purposes of estimating escapement. Unmarked and marked (i.e., with a subbasin mark combination)

steelhead of unknown origin were allocated to wild and subbasin hatchery components of the run based on the marked wild:unmarked hatchery ratios in the corresponding scale verified population. Unaged steelhead were allocated into specific age categories using the age structure estimated for the corresponding component of the run to which they were assigned; with one exception. Marked steelhead with a regenerated scale pattern were assumed to be a subbasin hatchery produced adult with a freshwater age 1 life history pattern if 1) the mark combination was valid for a hatchery production release in the Hood River subbasin, 2) the salt water life history pattern could be determined from the scale sample, and 3) the mark combination was valid for the estimated brood year of release.

Jack and adult spring chinook salmon were classified as either a natural/wild, subbasin hatchery, or stray hatchery produced fish based on 1) the mark combination and 2) scale analysis. Scale analysis was used to determine if an unmarked spring chinook salmon was either a natural/wild or hatchery produced fish. Unmarked natural/wild produced spring chinook salmon were assumed to be the progeny of natural production in the Hood River subbasin. Unmarked hatchery spring chinook salmon were assumed to be the mis-marked progeny of subbasin hatchery production releases in the Hood River subbasin. The number of unmarked hatchery spring chinook salmon sampled in the Hood River subbasin is typically low because 100% of the hatchery production group is marked prior to release. The only exception being that subbasin production groups were released either entirely, or partially, unmarked prior to the 1994 brood release (*see* **HATCHERY PRODUCTION, Production Releases**). Progeny of unmarked Carson and Deschutes stock brood releases returned in the 1992-1998 run years.

Marked jack and adult spring chinook salmon were classified as progeny of a Carson or Deschutes stock production release if the identifying mark combination was valid for the corresponding brood year of release (*see* **HATCHERY PRODUCTION, Production Releases**). Marked jack and adult spring chinook salmon were classified as stray fish if the mark combination was valid for a Carson or Deschutes stock production release, but invalid for the corresponding brood year of release. In both cases, the brood year of release was determined from scale analysis. Marked jack and adult spring chinook

salmon were assumed to be the progeny of a Carson or Deschutes stock production release if the age of the adult could not be determined, but the identifying mark combination was valid for one of these two stocks of release. This occurred in the very rare circumstance when 1) no scales were collected from an adult or 2) all the scales in the scale sample were regenerated. Marked jack and adult spring chinook salmon were classified as a stray fish if they bore a mark combination that did not correspond to a combination released in the Hood River subbasin. Migration timing, sex ratio, age structure, and escapements were estimated using the same methods described for summer and winter steelhead.

Jack and adult fall chinook and coho (*Oncorhynchus kisutch*) salmon were classified as either a natural or stray hatchery produced fish based on 1) the mark combination and 2) scale analysis. Scale analysis was used to determine if an unmarked fish was either a natural/wild or stray hatchery produced fish. Unmarked natural/wild produced fall chinook and coho salmon were assumed to be the progeny of natural production in the Hood River subbasin. Unmarked hatchery fall chinook and coho salmon are classified as stray hatchery fish. Migration timing, sex ratio, age structure, and escapements were estimated using the same methods described for summer and winter steelhead.

Harvest Estimates

Creel surveys were conducted on the mainstem of the Hood River from 1 January 2000 through 31 December 2001 to estimate harvest of summer and winter steelhead, spring and fall chinook salmon, and coho salmon. The survey area extended from the mouth of the Hood River to Powerdale Dam; a distance of approximately 4.5 miles. No creel was conducted above Powerdale Dam due to the fact that non-tribal harvest of salmon and steelhead was prohibited above Powerdale Dam. The non-tribal fishery above Powerdale Dam was first closed to the harvest of salmon and steelhead beginning on 1 April 1998. The closure remained in effect through the 2000 and 2001 calender years. Three sites are predominately utilized by fishers to gain access to the Hood River below Powerdale Dam.

Angling was allowed year-around below Powerdale Dam during the 2000

calendar year. Anglers were allowed to harvest marked summer and winter steelhead and both marked and unmarked fall chinook salmon and coho salmon. Chinook salmon were not legal to retain from 1 June through 31 July 2000 due to low run size. Trout season was open in the mainstem of the Hood River and in the East and Middle forks of the Hood River from 27 May to 31 October 2000 for catch and release only. Trout angling was restricted to artificial flies and lures in all tributaries, and in the mainstem of the Hood River above Powerdale Dam. The West Fork of the Hood River and its tributaries were closed to all angling. Use of bait downstream from Powerdale Dam was restricted to single point hooks #1 or larger (7/16 inch gap) or multiple point hooks #4 or larger (3/9 inch gap) for the entire year. Bag limit in the Hood River subbasin was restricted to a combined catch of two adult salmon and steelhead per day. The combined annual bag limit for salmon and steelhead was twenty adults.

Angling was allowed year-around below Powerdale Dam during the 2001 calendar year. Anglers were allowed to harvest marked summer and winter steelhead and both marked and unmarked fall chinook salmon and coho salmon. Chinook salmon were not legal to retain from 1 January 2001 until the season was opened by temporary rule for marked chinook salmon on 1 June 2001. The marked only chinook season remained in effect until 1 August 2001 when both marked and unmarked chinook salmon became legal to retain. Trout season was open in the mainstem of the Hood River and in the East and Middle forks of the Hood River from 26 May to 31 October 2001 for catch and release only. Trout angling was restricted to artificial flies and lures in all tributaries, and in the mainstem of the Hood River above Powerdale Dam. The West Fork of the Hood River and its tributaries were closed to all angling. Use of bait downstream from Powerdale Dam was restricted to single point hooks #1 or larger (7/16 inch gap) or multiple point hooks #4 or larger (3/9 inch gap) for the entire year. Bag limit in the Hood River subbasin was restricted to a combined catch of two adult salmon and steelhead per day. The combined annual bag limit for salmon and steelhead was twenty adults.

Two levels of stratification (day type and two week period) were used in summarizing the data. Estimates of catch, catch rate, and effort were determined for both strata. Sampling days were categorized as either a

weekend-holiday or week day and total catch was summarized by two week periods (bi-weekly) that encompassed the first through the fifteenth and the sixteenth through the end of each month. Days assigned as holidays for 2000 and 2001 are listed in Tables 1 and 2. The total number of days sampled in any given two week period ranged from 44-80% of the weekdays and 40-80% of the weekend-holiday days in 2000, and from 36-70% of the weekdays and 40-67% of the weekend-holiday days in 2001; with one exception. Sampling was essentially discontinued on 1 November, 2000 because of heavy sediment load moving through the Hood River subbasin. Poor water quality was the result of a glacier blowout (i.e., Newton Creek glacier) in Newton Creek; a tributary to the East Fork of the Hood River. The creel was re-implemented during the last two week period in December, 2000.

Effort (i.e., total hours fished) for each sample day (H_i) was estimated by developing a pressure curve, from periodic pressure counts, and calculating the area under the curve as follows:

$$H_i = (1/2) \sum_{k=1}^{r} \left[(T_k - T_{k-1}) (C_k + C_{k-1}) \right]$$

where

r = number of pressure counts per day,
C_k = angler count at the k^{th} pressure count, and
T_k = time at the k^{th} pressure count.

Table 1. Holidays summarized as weekend days in 2000.

Day	Holiday
01/01	New Years day
01/17	Martin Luther King day
02/21	Presidents day
05/29	Memorial day
07/04	Fourth of July
09/04	Labor day
11/10	Veterans day (Holiday)
11/11	Veterans day
11/23	Thanksgiving
12/25	Christmas day

Table 2. Holidays summarized as weekend days in 2001.

Day	Holiday
01/01	New Years day
01/15	Martin Luther King day
02/19	Presidents day
05/28	Memorial day
07/04	Fourth of July
09/03	Labor day
11/11	Veterans day
11/12	Veterans day (Holiday)
11/22	Thanksgiving
12/25	Christmas day

The first and last pressure counts were considered as zero points and were assumed to be one half hour before sunrise and one half hour after sunset. Pressure counts were conducted three to four times during the day. Times were determined by dividing the sampling day into either three or four equal length periods and conducting a pressure count at the point when angler numbers appeared to be the highest during the period. The direction of surveyor travel for the first pressure count was randomly selected. Subsequent pressure counts were made in the opposite direction of the previous count. Anglers were interviewed throughout the day to obtain catch rate information on both fishers that had completed angling as well as for those that had not completed angling. The catch rate in fish per angler hour on day i (R_i) was estimated by:

$$R_i = \sum_{j=1}^{m_i} f_{ij} \; / \; \sum_{j=1}^{m_i} h_{ij}$$

where

m_i = number of anglers interviewed on the i^{th} day,
f_{ij} = number of fish caught by the j^{th} angler on the i^{th} day, and
h_{ij} = number of hours fished by the j^{th} angler on the i^{th} day.

Total daily catch in numbers of fish on day i (TC_i) was estimated by:

$$TC_i = (R_i)(H_i)$$

Total catch for a given stratum (TC_s) was estimated by:

$$TC_s = (N/n) \sum_{i=1}^{n} TC_i$$

where

N = number of days within a stratum and
n = number of days sampled within a stratum.

Variance for the estimate of total catch in a given stratum [$V(TC_s)$] was estimated by:

$$V(TC_s) = N^2(1-(n/N))(S_b^2/n) + (N/n)\sum_{i=1}^{n}\left[(1-(\sum_{j=1}^{m_i} h_{ij}/H_i))(H_i^2)(S_w^2/m_i)\right]$$

where

$$S_b^2 = \sum_{i=1}^{n}(TC_i - \overline{TC})^2/(n-1) \qquad (i.e., \textit{between day variance}),$$

$$\overline{TC} = \sum_{i=1}^{n} TC_i/n \qquad (i.e., \textit{mean daily catch in stratum}), \textit{ and}$$

$$S_w^2 = \sum_{j=1}^{m_i}(f_{ij}/h_{ij} - R_i)^2/(m_i - 1) \qquad (i.e., \textit{within day variance}).$$

Total catch in a given stratum was allocated to defined categories of fish (i.e., wild summer steelhead kept, wild summer steelhead released, subbasin hatchery summer steelhead kept, etc.) based on the proportion that each

category of fish was represented in the known catch. The proportion in which a category of fish was represented in the stratum catch (p_s) was estimated as follows:

$$p_s = \sum_{i=1}^{n} \left[\frac{H_i}{\sum_{i=1}^{n} H_i} * p_i \right] \text{ (}\textit{includes only those days in which fish were caught}\text{)}$$

where

p_i = the proportion of fish caught on the i^{th} day for a given category of fish.

Daily proportions (p_i) for a given category of fish were estimated as follows:

$$p_i = \sum_{j=1}^{m_i} fc_{ij} \; / \; \sum_{j=1}^{m_i} f_{ij}$$

where

fc_{ij} = number of fish caught by the j^{th} angler on the i^{th} day for a given category of fish.

Variance for the estimate of the proportion of fish caught in a given category, and stratum [$V(p_s)$], was estimated by:

$$V(p_s) = \frac{N - n_p}{N n_p \bar{H}_s^2} * \frac{\sum_{i=1}^{n} (H_i p_i)^2 - 2p_s \sum_{i=1}^{n} (H_i^2 p_i) + p_s^2 \sum_{i=1}^{n} (H_i^2)}{(n_p - 1)}$$

$$+ \frac{1}{N n_p \bar{H}_s^2} * \sum_{i=1}^{n} \left[H_i^2 \frac{(H_i - h_i)}{H_i} * \frac{(p_i)(1 - p_i)}{\sum_{j=1}^{m_i} f_{ij}} \right]$$

where

$\bar{H}_s$ = *mean daily effort for the stratum and*

n_p = *number of days sampled in the stratum when fish were caught (i.e., the basis for estimating* p_s*).*

Variance in the estimate of catch for a given category of fish caught within a given stratum [$V(C_s)$] was derived by:

$$V(C_s) = V(p_s)*(TC_s)^2 + V(TC_s)*(p_s)^2 - V(p_s)*V(TC_s)$$

Bi-weekly and annual estimates of total catch (TC), and the variance associated with each estimate [V(C)], were determined for a given category of fish by summing the corresponding stratum estimates. Approximate 95% confidence intervals (C.I.), for a given category of fish, were calculated as follows:

$$95\%\ C.I. = TC \pm 2\sqrt{V(C)}$$

Number of anglers fishing in each stratum was estimated by dividing total effort in the stratum by the mean estimate of effort for anglers that had completed fishing within the stratum. Bi-weekly and annual estimates of angler numbers were determined by summing the corresponding stratum estimates. Formulas used for estimating harvest and 95% confidence intervals were from Carmichael et al. (1988) and from notes dated 05/28/97 from Mary Buckman, ODFW, Corvallis, Oregon.

Streamflows

Discharge (ft^3/sec) was estimated, using the direct discharge method, at selected sites located in the Hood River subbasin. Estimates were made at sites located in the West (RM 14.3), Middle (RM 1.3), and East (RM 1.0) forks of the Hood River, Lake Branch (RM 0.1), and Tony (RM 0.1) and Neal (RM 0.1) creeks (Figure 3).

A fiberglass tape measure was stretched across the sampling site to define one foot wide cells across the entire wetted area of the stream. The tape measure was oriented perpendicular to the stream at the point of measurement. A depth and water velocity measurement was taken in the center of each one foot wide cell. Depth was measured to the nearest one inch using a top setting stadia rod. Velocity was measured using a Marsh-McBirney Model 2000 portable flow meter. Velocity was measured at 60% of the water depth when an individual cells water depth was less than or equal to 2.0 feet. When water depth in a cell measured more than 2.0 feet, two velocity measurements were taken per cell; one at 20% of water depth and one at 80% of water depth. To calculate velocity for cells where water depth was greater than 2.0 feet, the velocity taken at 20% of cell depth and the velocity taken at 80% of cell depth were averaged together. Flow for each one foot cell was calculated as velocity times depth. Flow in each cell was calculated and summed to estimate discharge at the sampling site. Estimates of discharge were recorded, along with the water height reading at the corresponding staff gauge maintained at the sampling site. Discharge was estimated over a wide range of staff gauge

readings. The correlation between the staff gauge reading, and its corresponding flow estimate, was then used to develop a regression line that could be used to estimate discharge from the staff gauge. Staff gauges were typically read every 1-3 days.

RAINBOW-STEELHEAD

Natural Production

Juvenile migrant traps were operated in the mainstem of the Hood River (i.e., from 1994-2001); in the West (i.e., from 1994-2001), Middle (i.e., from 1995-2001), and East (i.e., from 1994-2000) forks of the Hood River; Lake Branch (i.e., from 1997-2001); and in Green Point Creek (i.e., 1998-2001). The sampling period for estimating the number of downstream migrant smolts passing each migrant trap extended from around the last week of March/first week of April to the end of July (Appendix Tables A-1 and A-2). This was based on the assumption that smolt migration was complete by 31 July.

The estimated number of rb-st annually migrating past the mainstem migrant trap ranged from 5,955-31,035 (Table 3). Estimates of the number of downstream migrant rb-st are not adjusted for production below the migrant trap and do not include numbers of downstream migrant rb-st from Neal Creek; a major tributary draining into a side channel opposite the migrant trap. Limited sampling with fyke nets and screw traps indicates Neal Creek may produce around 400-800 downstream migrant rb-st (unpublished data on 2/3/2002 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon). Age-2 rb-st migrants ranged from 61-88% of the total production estimate at the mainstem migrant trap (Table 3).

The estimated number of downstream migrant rb-st annually migrating past migrant traps located in the West, Middle, and East forks of the Hood River ranged from 667-4,075, 378-3,228, and 1,566-3,297, respectively (Table 4). The estimated numbers of downstream migrant rb-st annually migrating past migrant traps located in Lake Branch and Green Point Creek ranged from 252-1,329 and 78-288, respectively (Table 4).

The estimated number of steelhead smolts annually migrating past the mainstem migrant trap ranged from 4,656-25,485 smolts (1994-2001; Table 5). Race specific estimates of the number of steelhead smolts annually migrating from the Hood River subbasin ranged from 1,165-10,006 summer steelhead smolts and 4,274-22,704 winter steelhead smolts, by brood year (Table 6).

The estimated number of steelhead smolts annually migrating past migrant traps located in the West, Middle, and East forks of the Hood River ranged from 334-3,008 (1994-2001), 312-2,440 (1995-2001), and 1,045-2,246 (1994-2000), respectively (Table 7). The estimated number of steelhead smolts annually migrating past migrant traps located in Lake Branch and Green Point Creek ranged from 137-972 (1997-2001) and 23-85 (1998-2001), respectively (Table 7).

A preliminary analysis of the smolt production estimates at the mainstem migrant trap suggest that the Hood River subbasin may be at, or near carrying capacity, at least for some brood years. This hypothesis is based on the correlation beginning to develop between female spawner escapements and smolt production (Table 6). Data show that the 1996 brood produced 221% more summer steelhead smolts and 431% more winter steelhead smolts than corresponding estimates for the 1993 brood; even though the combined female spawner escapement for the 1993 brood was 198% higher than for the 1996 brood (Table 6). Subbasin smolt production for the 1996 brood was also the highest on record even though total spawner escapement for the 1996 brood was the lowest on record for the 1993-1997 broods (Table 6).

The various physical and environmental factors which currently constrain production of steelhead in the Hood River subbasin are presently unknown, but preliminary data suggests that the primary bottlenecks may be high spring freshets and low summer streamflows. The magnitude and periodicity of these inherently natural events are undoubtedly effected by past and present land management practices on both public and private lands in the Hood River subbasin. No data is available to either compare or contrast the Hood River subbasins current carrying capacity against historical levels.

Preliminary data indicates that smolt-to-adult survival (by year of smolt

migration) back to the mouth of the Hood River subbasin will probably fall within the range of 6-10% (Table 8). This hypothesis is based on 1) complete adult returns for the 1994 and 1995 estimates of subbasin smolt production (Table 8), 2) incomplete adult returns for the 1996-1999 estimates of subbasin steelhead smolt production (Table 8), and 3) the assumption that returns to the Powerdale Dam trap are a fairly accurate estimator of wild steelhead escapements to the Hood River subbasin. The last assumption is based on the fact that the Hood River subbasin is closed to the harvest of unmarked steelhead.

The combined returns of wild adult summer and winter steelhead to the Powerdale Dam trapping facility ranged from 319-568 adult steelhead for the 1989-1994 brood years (Table 9).

Size and Weight

Annual estimates of mean fork length, weight, and condition factor are summarized for downstream migrant rb-st in Tables 10-12. Mean fork length (i.e., where N is greater than 2) ranged from 73-97 mm, 84-169 mm, 118-187 mm, and 160-206 mm for age-0, age-1, age-2, and age-3 rb-st, respectively (Table 13). Mean fork length for age-1 and age-2 migrants was typically higher at the mainstem migrant trap than at migrant traps located in the West, Middle, and East forks of the Hood River (Table 13). Mean fork length of age-1 migrants sampled at the mainstem migrant trap averaged 44 mm, 40 mm, and 37 mm greater than the mean fork length of migrants sampled at the West, Middle, and East fork migrant traps, respectively. Mean fork length of age-2 migrants sampled at the mainstem migrant trap averaged 11 mm, 7 mm, and 5 mm greater than the mean fork length of migrants sampled at the West, Middle, and East fork migrant traps, respectively. Mean fork length of age-3 migrants at the mainstem migrant trap was generally the same as in the West, Middle, and East fork migrant traps. The previous comparisons and summaries are based on means calculated from sample sizes greater than two fish.

Length x weight regressions, for downstream migrant rb-st sampled at the mainstem migrant trap in 2000 and 2001, are presented in Figures 4 and 5, respectively. Length frequency histograms, for downstream migrant rb-st

sampled at the mainstem migrant trap in 2000 and 2001, are presented by age category in Figures 6 and 7, respectively.

Mean fork length at the mainstem migrant trap was typically lower for freshwater age-1 through age-3 categories of downstream migrant wild rb-st, when compared with the mean fork length of both hatchery summer and winter steelhead smolts sampled at the mainstem migrant trap (Table 13; *see* **HATCHERY PRODUCTION**, **Size and Weight**). The only exception was for freshwater age 3 migrants. Mean fork length of freshwater age 3 migrants was similar, or in some instances slightly higher, when compared with the lower range of estimates for hatchery summer and winter steelhead sampled in selected years at the mainstem migrant trap (*see* **HATCHERY PRODUCTION**, **Size and Weight**).

Mean condition factor for freshwater age-2 and age-3 downstream migrant wild rb-st sampled at the mainstem migrant trap, was consistently lower than the mean condition factor of both hatchery summer and winter steelhead sampled at Oak Springs Hatchery (Table 12; *see* **HATCHERY PRODUCTION**, **Size and Weight**). Mean condition factor for downstream migrant wild rb-st sampled at the mainstem migrant trap, was similar to that of hatchery summer and winter steelhead smolts that were also sampled at the mainstem migrant trap (Table 12; *see* **HATCHERY PRODUCTION**, **Size and Weight**).

Smolt Migration Timing

Peak steelhead smolt migration was estimated to occur from mid-April to the end of May in both 2000 and 2001 (Figures 8 and 9).

CUTTHROAT TROUT

Natural Production

Adult sea-run cutthroat trout are captured at the Powerdale Dam trap from late February to early August (Table 14). Numbers escaping to the Powerdale Dam trap ranged from a low of zero for the 1993-1996 and 1998-1999 run years to a high of 11 in the 2001 run year (Table 14). The low numbers of adult sea-run cutthroat trout caught at the Powerdale Dam trap suggest that the

anadromous form of this species may be at a severely depressed level in the Hood River subbasin.

Counts of sea-run cutthroat trout smolts at the mainstem migrant trap ranged from 2-18 from 1994-2001 (Table 15). Counts at the migrant trap located in the East Fork of the Hood River indicate that natural production predominately occurs in this tributary. Counts of sea-run cutthroat trout smolts at the East Fork migrant trap ranged from 3-20 from 1994-2000 (Table 15). The combined counts of sea-run cutthroat trout smolts sampled at migrant traps located in the West and Middle forks of the Hood River ranged from 1-6 from 1995-2001 (Table 15).

Size and Weight

Mean fork length, weight, and condition factor was estimated for the combined sample of downstream migrant sea-run cutthroat trout smolts captured at traps located throughout the Hood River subbasin. Data is summarized for the years 1994-2001 in Table 16. Annual estimates of mean fork length ranged from 150-186 mm from 1994-2001 (Table 16).

BULL TROUT

Natural Production

Adult bull trout are captured at the Powerdale Dam trap from early May to early October (Table 17). Numbers escaping to the Powerdale Dam trap ranged from 2-28 adults (Table 17). Median date of migration occurred from late May to early July (Table 17).

Age Composition, Size, and Weight

Adult bull trout sampled at the Powerdale Dam trap were predominately age 4 through age 6 adults (Table 18). Mean fork length and weight are summarized in Tables 19 and 20, respectively. Annual estimates of mean fork length ranged from 37-39 cm (age 3), 39-50 cm (age 4), 42-51 cm (age 5), and 51-58 cm (age 6) adults (Table 19).

ADULT SUMMER STEELHEAD

Migration Timing

Wild and subbasin hatchery (Foster/Skamania stock) summer steelhead begin entering the Powerdale Dam trap during in early March, and a given run year encompasses two calendar years for both components of the run (Figure 10; Tables 21 and 22). The median migration date occurred from early July to late September for the wild run and from early June to late July for the Foster stock subbasin hatchery run (Table 21). Migration to the Powerdale Dam trap was completed by late April to late May of the second calendar year for both the wild and subbasin hatchery components of the run (Table 22).

Harvest, Escapement, and Survival

In 2000 and 2001, sport fishers caught and released an estimated 183 and 166 wild summer steelhead, respectively; harvested an estimated 456 and 719 subbasin hatchery summer steelhead, respectively; and caught and released an estimated 122 and 159 subbasin hatchery summer steelhead, respectively (Tables 23 and 24). Run year specific estimates of harvest ranged from 11-182 "recycled" adult hatchery summer steelhead (Appendix Table F-2). Estimates of the number of caught and released stray hatchery summer steelhead are in Appendix Tables E-1 and E-2 for the 2000 and 2001 sampling seasons. Peak harvest occurred from late March to late July.

Run year specific estimates of harvest for the 1996-1997 through 2000-2001 run years ranged from 224-735 subbasin hatchery summer steelhead (Appendix Table F-1) and exploitation rates ranged from 19-35% on non-recycled adults (Appendix Table F-3). Run year specific estimates of exploitation rates on recycled hatchery summer steelhead ranged from 5-34% for the 1996-1997 through 2000-2001 run years (Appendix Table F-2).

Escapements to the Powerdale Dam trap ranged from 79-490 wild, 485-1,726 Foster stock subbasin hatchery, 7 Hood River stock subbasin hatchery, and 2-18 stray hatchery summer steelhead for the 1992-1993 through 2000-2001 run years (Table 25). The percentage of summer steelhead with predator scars ranged from 14-43% (Appendix Table G-1). The percentage of summer steelhead with

net marks and hook scars ranged from 5-19% and 2-4%, respectively (Appendix Table G-1). Bi-weekly disposition of adult summer steelhead, collected from the Powerdale Dam trap, is documented in Appendix Tables B-1 and B-2 for the 1999-2000 and 2000-2001 run years, respectively. Bi-weekly disposition of adult summer steelhead, collected from the Powerdale Dam trap, is documented through 31 December, 2001 in Appendix Table B-3 for the 2001-2002 run year. Run year totals of the disposition of adult summer steelhead, collected from the Powerdale Dam trap, are documented for the 1992-1993 through 2000-2001 run years in Table 26.

All wild and subbasin (Foster stock) hatchery summer steelhead were passed above Powerdale Dam prior to 8 August 1997. No stray hatchery summer steelhead were passed above Powerdale Dam beginning with the 1992-1993 run year. The HRPP discontinued passing Foster stock hatchery summer steelhead above Powerdale Dam beginning on 8 August 1997. Hatchery adult summer steelhead not passed above Powerdale Dam were either transported down river and released at approximately River Mile (RM) 0.2 in the mainstem of the Hood River (*see* **APPENDIX B**) or transferred to either Kingsley Reservoir or Taylor Lake. Foster stock and stray hatchery summer steelhead were not passed above Powerdale Dam in order to prevent non-indigenous stocks from escaping to the primary summer steelhead spawning areas in the Hood River subbasin. Adults were released at the mouth of the Hood River based on the assumption that these fish would return to the Powerdale Dam trap, thereby, providing additional harvest opportunities in the sport fishery located below Powerdale Dam. Adult hatchery summer steelhead that were recaptured at the Powerdale Dam trap were again recycled through the sport fishery below Powerdale Dam. The HRPP maintained this policy through the 2000-2001 run year.

Numbers of subbasin and stray hatchery adult summer steelhead, recycled through the sport fishery, ranged from 28-1,167 adults for the 1995-1996 through 2000-2001 run years (Table 26). The percentage of adults that returned to the Powerdale Dam trap, after each successive release at the mouth of the Hood River, ranged from 25-75% for adults recycled through the sport fishery from one to five times (Table 27). The discrepancy between the number of recycled adults recaptured at the Powerdale Dam trap, and the number harvested in the sport fishery, has been fairly high in some years; which

leaves a large component of the recycled adults unaccounted for in the total population of recycled adults. The ultimate destination of these recycled adults is unknown but most are believed to leave the subbasin. This assumption is based on 1) an exploitation rate that has been as low as 5% for recycled adults (Appendix Table F-2), 2) the limited amount of spawning observed below Powerdale Dam, 3) the limited number of pre-spawning mortalities reported as having been observed below Powerdale Dam, and 4) the return of tags recovered from adults harvested in other subbasins located in both Oregon and Washington (unpublished data on 7/9/2003 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon). Recycled adult summer steelhead that were later recaptured at the Powerdale Dam trap, returned to the adult trapping facility on average 12 to 29 days subsequent to transportation and release at the mouth of the Hood River (i.e., for adults recycled one to five times; Table 28).

Survival from smolt-to-adult return back to the Powerdale Dam trap varied widely among salt water age categories for hatchery production releases of Foster stock summer steelhead (Table 29). Brood year specific estimates ranged from 0.69-1.50% for the 1990-1995 brood releases (Table 29). Smolt-to-adult survival back to the mouth of the Hood River subbasin, by year of migration, ranged from 1.3-2.3% for Foster stock hatchery summer steelhead released as smolts in 1994 and 1995 (Table 30). The post-release smolt-to-adult survival rate of Foster stock hatchery summer steelhead smolts released in 1994 and 1995 ranged from 67%-86% lower than the smolt-to-adult survival rate for wild steelhead migrating as smolts in the same years (Table 30; *see* **RAINBOW-STEELHEAD, Natural Production**).

The low post-release survival rate associated with Foster stock hatchery production releases may in part be attributed to the fact that estimates were derived from broods that were directly released into the Hood River subbasin from a hatchery facility located outside of the subbasin. Off station releases are believed to have a much lower post-release survival rate than hatchery smolts that are volitionally released from acclimation facilities located in the target subbasin. Several inter-related factors that may negatively impact post-release survival of hatchery smolts include: 1) a high in-basin post-release smolt mortality rate associated with the cumulative

effects of stress prior to, and shortly after, release, 2) the percentage of hatchery smolts which residualize, 3) the possible poor homing ability of returning hatchery adults, and 4) any inherent reduction in the genetic fitness of the hatchery stock. While the exact cause, or causes, of the low rate of return are unknown, it is believed that post-release survival can be improved by 1) developing hatchery broodstock from the indigenous population and 2) volitionally releasing hatchery smolts from acclimation facilities located in the Hood River subbasin. However, very preliminary data would suggest that this may not be the case (Table 30; unpublished data on 7/9/2003 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon).

The HRPP began developing a Hood River stock of hatchery summer steelhead from wild adult summer steelhead escaping to the Powerdale Dam trap in the 1997-1998 run year (1998 brood). Hood River stock hatchery summer steelhead smolts from the 1998 brood were acclimated prior to being volitionally released into the Hood River subbasin (*see* **HATCHERY PRODUCTION**). The HRPP's current hatchery production guidelines specify that all Hood River stock hatchery production releases will be acclimated for one to four weeks prior to release.

Age Composition, Size, Sex Ratio, and Fecundity

Wild summer steelhead migrate mainly as freshwater age-2 and age-3 smolts and return mainly as 2-salt adults (Table 31; *see* **RAINBOW-STEELHEAD**, **Natural Production**). Virtually all subbasin hatchery smolts migrate in the year of release (i.e., freshwater age-1) and return mainly as 2-salt adults (Table 31). Repeat spawners at the Powerdale Dam trap comprised 1.7-9.2% of the wild summer steelhead run and 0.6-3.2% of the Foster stock hatchery summer steelhead run (Table 31). Only two repeat spawners in the 1999-2000 and 2000-2001 run years had multiple spawning checks (Tables 32-35).

Mean fork length of wild summer steelhead without a spawning check ranged from 51-60 cm for 1-salt adults, 66-73 cm for 2-salt adults, and 73-82 cm for 3-salt adults and was 79 cm for 4-salt adults (Tables 36-38). Mean fork length of Foster stock subbasin hatchery summer steelhead without a spawning

check ranged from 53–61 cm for 1–salt adults, 67–69 cm for 2–salt adults, and 78–81 cm for 3–salt adults and was 79 cm for 4–salt adults (Tables 36–38). The previous summaries are based on means calculated from sample sizes greater than two adults.

Mean weight of wild summer steelhead without a spawning check ranged from 1.6–2.3 kg for 1 salt adults, 3.2–3.8 kg for 2–salt adults, and 4.1–5.3 kg for 3–salt adults (Tables 39–41). Mean weight of Foster stock subbasin hatchery summer steelhead without a spawning check ranged from 1.6–2.0 kg for 1 salt adults, 2.9–3.4 kg for 2–salt adults, and 4.7–5.3 kg for 3–salt adults (Tables 39–41). The previous summaries are based on means calculated from sample sizes greater than two adults.

Sex ratios varied among age categories and run year for both wild and subbasin hatchery summer steelhead (Table 42). In general, 2–salt adults returned predominately as females and 3–salt adults predominately as males (Table 42).

Fecundity of wild summer steelhead ranged from 3,510 to 5,010 eggs per female for 1–salt adults, 2,700 to 7,950 eggs per female for 2–salt adults, and 3,168 to 5,616 eggs per female for 3–salt adults (Table 43).

ADULT WINTER STEELHEAD

Migration Timing

Wild and hatchery adult steelhead that escape to the Powerdale Dam trap are classified as either a summer or winter run steelhead based on a combination of physical characteristics (*see* **METHODS**, **Adult Trapping**). Evaluation of these criteria is often a highly subjective process that can result in the mis–identification of an adult steelheads race. The potential for incorrectly classifying the race of an adult steelhead primarily exists during the time period extending from 1 September through 31 January, when the external physical characteristics of both races can be fairly similar. This problem has been documented on several occasions at the Powerdale Dam trap when coded wire tagged hatchery steelhead were initially classified as Hood

River stock winter steelhead and then later identified as hatchery summer steelhead from the coded wire tag. There were two such cases when an adult steelhead was initially classified as a winter run fish and then later identified from the coded wire tag as B-run hatchery summer steelhead that originated from Dworshak National Fish Hatchery.

The ability to accurately differentiate between the two races of steelhead entering the Hood River subbasin is critically important in determining when the winter steelhead run first begins entering the Hood River subbasin. Wild winter steelhead are believed to begin entering the Hood River subbasin around the last two weeks of December and the first two weeks of January (Table 44; Figure 11). Wild and hatchery adult steelhead escaping to the Powerdale Dam trap prior to mid-December, that are classified as winter steelhead, are believed to be mis-classified summer steelhead. To date, only nine wild adult steelhead potentially fall into this category (Table 44). Numbers of Hood River stock hatchery winter steelhead, escaping to the Powerdale Dam trap prior to mid-December, have increased in the last two run years (Table 44). The earliest returning Hood River stock hatchery winter steelhead sampled at Powerdale Dam was documented during the 1998-1999 run year (unpublished data on 9/21/2000 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon). The adult winter steelhead was collected from the Powerdale Dam trap on 21 September, 1998.

The Hood River stock was initially developed from wild adult steelhead that were collected from the Powerdale Dam trap and classified as winter steelhead. The extent to which wild summer steelhead were inadvertently incorporated into the hatchery broodstock creates the possibility that the hatchery program has produced a certain number of early returning summer/winter hybrids. There is currently no definitive methodology for determining if wild summer steelhead were ever used for hatchery winter steelhead broodstock, but there is one documented case when a hatchery summer steelhead was mis-classified as a winter steelhead and collected for winter steelhead broodstock. The race and origin of the adult summer steelhead was determined from a coded wire tag (unpublished data on 9/21/2000 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon). The hatchery summer steelhead was ultimately not used for winter steelhead

broodstock because it died before it could be spawned, but the migration timing of the Hood River stock of hatchery winter steelhead suggests that some level of hybridization does occur in the hatchery winter steelhead program.

Hood River stock hatchery winter steelhead in the 1994-1995 through 1996-1997 run years did not escape to the Powerdale Dam trap in any significant numbers until late January and early February and only two hatchery winter steelhead were recorded prior to mid- January for the 1991-1992 through 1996-1997 run years (Table 44). The latter is significant primarily because hatchery returns from the 1991-1992 through 1993-1994 run years were progeny of Big Creek stock hatchery winter steelhead; which is an early returning winter steelhead stock. By comparison, eighteen Hood River stock hatchery winter steelhead in the 1998-1999 run year had escaped to the Powerdale Dam trap prior to mid-December.

The winter steelhead run year may encompass two calendar years for both wild and hatchery components of the run (Table 44; Figure 11). The median migration date occurred from early April to early May for wild winter steelhead and from late February to late April for Hood River stock hatchery winter steelhead. Migration to the Powerdale Dam trap was completed for both wild and Hood River stock hatchery components of the run by late June of the second calendar year (Table 44).

The wild run of winter steelhead migrated into the Hood River subbasin later than the subbasin hatchery run for the 1991-1992 through 1994-1995 run years but run timing was similar for both wild and subbasin hatchery components of the run returning in the 1995-1996 through 1998-1999 run years. The shift in run timing for the subbasin hatchery component of the run is attributed to the use of wild Hood River stock winter steelhead as hatchery broodstock. Previous runs of subbasin hatchery winter steelhead were comprised of adults returning from Big Creek stock hatchery winter steelhead releases in the subbasin. The native Hood River stock has a much later run timing than the Big Creek stock of winter steelhead which is an early run hatchery stock. The 1994-1995 run year is the last run year in which adult hatchery winter steelhead returned from Big Creek stock hatchery releases in the Hood River subbasin.

Harvest, Escapement, and Survival

Harvest in the sport fishery ranged from 246-550 caught and released wild winter steelhead, 151-495 kept subbasin hatchery winter steelhead, and 22-109 caught and released subbasin hatchery winter steelhead; for the 1999-2001 sampling years (Tables 45-47). Run year specific estimates of harvest ranged from 0-80 recycled adult hatchery winter steelhead (Appendix Table F-2). Estimates of the number of caught and released stray hatchery winter steelhead are in Appendix Tables E-1 and E-2. Peak harvest occurred from early February to late April.

Run year specific estimates of harvest for the 1996-1997 through 2000-2001 run years ranged from 172-351 subbasin hatchery winter steelhead (Appendix Table F-1) and exploitation rates ranged from 23-41% on non-recycled adults (Appendix Table F-3). Run year specific estimates of the exploitation rate on recycled hatchery winter steelhead ranged from 0-10% for the 1996-1997 through 2000-2001 run years (Appendix Table F-2).

Escapements to the Powerdale Dam trap ranged from 206-1,017 wild, 108-917 subbasin hatchery, and 1-38 stray hatchery winter steelhead for the 1991-1992 through 2000-2001 run years (Table 48). The percentage of winter steelhead with predator scars ranged from 16-53% (Appendix Table G-1). The percentage of winter steelhead with net marks and hook scars ranged from 2-7% and 0.8-6%, respectively (Appendix Table G-1). Bi-weekly disposition of adult winter steelhead, collected from the Powerdale Dam trap, is summarized in Appendix Tables C-1 and C-2 for the 1999-2000 and 2000-2001 run years, respectively. Run year totals of the disposition of adult winter steelhead, collected from the Powerdale Dam trap, are documented for the 1991-1992 through 2000-2001 run years in Table 49.

All wild and hatchery winter steelhead were passed above Powerdale Dam prior to the 1992-1993 run year. The HRPP discontinued passing subbasin (Big Creek stock) and stray hatchery winter steelhead above Powerdale Dam beginning with the 1992-1993 run year. Adult winter steelhead not passed above Powerdale Dam were transported down river and released at approximately RM 0.2 in the mainstem of the Hood River. A proposal was considered to transfer and

release excess subbasin and stray hatchery winter steelhead into either Kingsley Reservoir or Taylor Lake but this proposal was never implemented through the 2000-2001 run year (Table 49); as was done with the summer steelhead program (*see* **ADULT SUMMER STEELHEAD**, **Harvest, Escapement, and Survival**).

Big Creek stock and stray hatchery winter steelhead were not passed above Powerdale Dam in order to prevent non-indigenous stocks from escaping to the primary winter steelhead spawning areas in the Hood River subbasin. Adults were released at the mouth of the Hood River based on the assumption that these fish would return to the Powerdale Dam trap, thereby, providing additional harvest opportunities in the sport fishery located below Powerdale Dam. Adult winter steelhead recaptured at the Powerdale Dam trap were again recycled through the sport fishery. The HRPP maintained this policy through the 2000-2001 run year.

All Hood River stock hatchery winter steelhead escaping to the Powerdale Dam trap, prior to the 1994-1995 run year, were recycled through the sport fishery (Olsen et al. 1999). Hood River stock hatchery winter steelhead were passed above Powerdale Dam in very limited numbers beginning with the 1995-1996 run year and were passed above Powerdale Dam in numbers designed not to exceed that of the wild run beginning with the 1996-1997 run year (Olsen et al. 1999). Hood River stock hatchery winter steelhead not passed above Powerdale Dam were recycled through the sport fishery below Powerdale Dam along with the stray hatchery winter steelhead. Adults recaptured at the Powerdale Dam trap were again recycled through the sport fishery. The HRPP restricted the number of Hood River stock hatchery winter steelhead passed above Powerdale Dam through the 2000-2001 run year.

Numbers of subbasin and stray hatchery adult winter steelhead recycled through the sport fishery ranged from 21-308 adults for the 1992-1993 through 2000-2001 run years (Table 49). The percentage of adults returning to the Powerdale Dam trap, after each successive release at the mouth of the Hood River, ranged from 19-60% for adults recycled through the sport fishery from one to three times. The discrepancy between the number of adults recaptured at the Powerdale Dam trap, and the number harvested in the sport fishery, has

been fairly high in all years; which leaves a large component of the recycled adults unaccounted for in the total population. Where recycled adults ultimately end up is unknown but most are believed to leave the subbasin. This assumption is based on 1) an exploitation rate that ranged from 0-10% for recycled adults, 2) the limited amount of spawning observed below Powerdale Dam, 3) the limited number of pre-spawning mortalities reported as having been observed below Powerdale Dam, and 4) the return of tags recovered from adults harvested in other subbasins located in both Oregon and Washington (unpublished data on 9/21/2000 from ODFW, Mid-Columbia District, The Dalles, Oregon). Recycled adult winter steelhead that were later recaptured at the Powerdale Dam trap, returned to the adult trapping facility on average 4 to 17 days subsequent to transportation and release at the mouth of the Hood River (i.e., for adults recycled one to three times; Table 51).

Survival from smolt-to-adult return back to the Powerdale Dam trap varied widely among salt water age categories for hatchery production releases of both the Hood River and Big Creek stocks of winter steelhead (Table 52). Brood year specific estimates of survival ranged from 0.20-1.58% for the 1992-1996 Hood River stock brood releases. Smolt-to-adult survival back to the mouth of the Hood River subbasin, by year of migration, ranged from 1.14-2.38% for Hood River stock hatchery winter steelhead released as smolts from 1994-1996 (Table 53). The post-release smolt-to-adult survival rate of Hood River stock hatchery winter steelhead smolts released from 1994-1996 ranged from 74%-81% lower than the smolt-to-adult survival rate for wild steelhead migrating as smolts in the same years (Table 53; *see* **RAINBOW-STEELHEAD, Natural Production**).

The low post-release survival rate associated with Hood River stock hatchery production releases may in part be attributed to the fact that estimates were derived from broods that were directly released into the Hood River subbasin from a hatchery facility located outside of the subbasin. Off station releases are believed to have a much lower post-release survival rate than hatchery smolts that are volitionally released from acclimation facilities located in the target subbasin. Several inter-related factors that may negatively impact post-release survival of hatchery smolts include: 1) a high in-basin post-release smolt mortality rate associated with the cumulative

effects of stress prior to, and shortly after, release, 2) the percentage of hatchery smolts which residualize, 3) the possible poor homing ability of returning hatchery adults, and 4) any inherent reduction in the genetic fitness of the hatchery stock. While the exact cause, or causes, of the low rate of return are unknown, it is believed that post-release survival will be improved by volitionally releasing hatchery smolts from acclimation facilities located in the Hood River subbasin. However, very preliminary data would suggest that this may not be the case (Table 53; unpublished data on 7/9/2003 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon). The relative relation between the smolt-to-adult survival of wild steelhead smolt, and the post release survival of acclimated Hood River stock hatchery winter steelhead smolts, would indicate that acclimation may not be improving the post-release survival of subbasin hatchery production releases (Table 53).

The HRPP began acclimating Hood River stock hatchery winter steelhead beginning with the 1995 brood release (*see* **HATCHERY PRODUCTION**). The HRPP's current hatchery production guidelines specify that all Hood River stock hatchery production releases will be acclimated for one to four weeks prior to release.

Age Composition, Size, Sex Ratio, and Fecundity

Wild winter steelhead predominately migrate as freshwater age-2 and age-3 smolts and return mainly as 2- and 3-salt adults (Table 54). Subbasin hatchery winter steelhead migrate as freshwater age-1 and age-2 smolts and return mostly as 2- and 3-salt adults (Table 54). Repeat spawners at the Powerdale Dam trap comprised 2.5-13.3% of the wild winter steelhead run and 0-5.2% of the Hood River stock hatchery winter steelhead run (Table 54). Three repeat spawners in the 1999-2000 run year and nine repeat spawners in the 2000-2001 run year had multiple spawning checks (Tables 55-58).

Mean fork length of wild adult winter steelhead without a spawning check ranged from 49-54 cm for 1-salt adult, 59-68 cm for 2-salt adults, and 75-80 cm for 3-salt adults (Tables 59-61). Mean fork length for Hood River stock hatchery adult winter steelhead without a spawning check ranged from

44-48 cm for 1-salt adults, 62-70 cm for 2-salt adults, and 68-80 cm for 3-salt adults (Tables 59-61). The previous summaries are based on means calculated from sample sizes greater than two adults.

Mean weight of wild adult winter steelhead without a spawning check ranged from 1.2-1.6 kg for 1-salt adults, 1.8-3.5 kg for 2-salt adults, and 4.5-5.4 kg for 3-salt adults (Tables 62-64). Mean weight for Hood River stock hatchery adult winter steelhead without a spawning check ranged from 0.8-1.1 kg for 1-salt adults, 2.4-3.5 kg for 2-salt adults, and 3.2-5.2 kg for 3-salt adults (Tables 62-64). The previous summaries are based on means calculated from sample sizes greater than two adults.

Although sex ratio as a percentage of females varied markedly among age classes, wild adult winter steelhead returned mostly as females (Table 65). Subbasin hatchery adult winter steelhead mainly returned as males in age category 1/2 and as females in age category 1/3 (Table 65). Both wild and subbasin hatchery repeat spawners returned mainly as females.

Fecundity of wild winter steelhead was estimated at 2,900 eggs per female for one 1-salt adult and ranged from 1,737 to 7,380 eggs per female for 2-salt adults, 2,493 to 8,096 eggs per female for 3-salt adults, and 3,240 to 4,632 eggs per female for 4-salt adults (Table 66). Fecundity of Hood River stock hatchery winter steelhead ranged from 1,590 to 6,201 eggs per female for 2-salt adults, 2,560 to 7,920 eggs per female for 3-salt adults, and was estimated at 5,280 eggs per female for 4-salt adults (Table 66).

JACK AND ADULT SPRING CHINOOK SALMON

Migration Timing

Natural spring chinook salmon begin entering the Powerdale Dam trap in early May and subbasin hatchery spring chinook salmon begin entering the trap in late April (Table 67). Median date of migration for jack and adult salmon (i.e., excluding mini-jack salmon) occurred between the first two weeks of June and the last two weeks of August for the natural run, and between the last two weeks of May and the last two weeks of June for the subbasin hatchery

run. Both natural and subbasin hatchery components of the run were completed by late September to early October (Table 67).

Harvest, Escapement, and Survival

In the sampling area, sport fishers harvested an estimated 28 unmarked and subbasin hatchery jack and adult spring chinook salmon from the 2000 run year and 54 unmarked and subbasin hatchery jack and adult spring chinook salmon from the 2001 run year (Tables 68-71). Estimates of the number of caught and released stray hatchery spring chinook salmon are in Appendix Tables E-3 and E-4. Spring chinook salmon were harvested from early May through mid-November (Tables 68-71). Run year specific estimates of harvest are summarized in Appendix Table F-4 for the 1996-2001 run years.

Escapements to the Powerdale Dam trap ranged from 20-97 natural, 36-461 Carson stock hatchery, and 0-30 stray hatchery jack and adult spring chinook salmon for the 1992-2001 run years (Table 72). Escapements to the Powerdale Dam trap ranged from 17-1,056 Deschutes stock hatchery jack and adult spring chinook salmon for the 1998-2001 run years (Table 72). Mini-jack escapements to the Powerdale Dam trap ranged from 0-13 natural and 0-918 Deschutes stock hatchery spring chinook salmon for the 1992-2001 run years (Table 72). The percentage of spring chinook salmon with predator scars ranged from 4-30% (Appendix Table G-1). The percentage of spring chinook salmon with either a net mark or hook scar ranged from 0-6% and 0-3%, respectively (Appendix Table G-1).

Survival from smolt to returning jack and adult salmon back to the Powerdale Dam trap varied widely among age categories for hatchery production releases of both the Carson and Deschutes stocks of spring chinook salmon (Table 73). Post-release survival from smolt to jack and adult return back to the Powerdale Dam trap ranged from 0.18%-0.19%, and averaged 0.18%, for the Carson stock (1989-1990 broods) and ranged from 0.01%-0.18%, and averaged 0.07%, for the Deschutes stock (1991 and 1993-1996 broods).

Age Composition, Size, and Sex Ratio

Scale analysis and production estimates of fall migrants indicate that naturally produced spring chinook salmon migrate as both sub-yearling and yearling smolts and return as four year old adults (Table 74; unpublished data on 7/11/2003 from ODFW, Fish Research, High Desert Region, Mid-Columbia District, The Dalles, Oregon). The sub-yearling smolt life history pattern appears to be unique to the natural Hood River run, which was developed from Carson stock hatchery production releases in the Hood River subbasin (*see* Olsen et al. 1994 and Olsen et al. 1995). What mechanism might cause naturally produced spring chinook salmon to migrate as sub-yearling smolts in the Hood River subbasin, and how progeny of Deschutes stock hatchery spring chinook salmon will ultimately adapt to the Hood River subbasin, is unknown.

Mean fork length of natural adult spring chinook salmon that migrated as yearling smolts was estimated at 49 cm for age-3 jacks and ranged from 71-87 cm for age-4 adults and 79-95 cm for age-5 adults (Tables 75-77). Mean fork length for Deschutes stock hatchery produced spring chinook salmon ranged from 52-55 cm for age-3 jacks and 71-76 cm for age-4 adults, and was estimated at 89 cm for age-5 adults (Tables 75-77). The previous summaries are based on means calculated from sample sizes greater than two adults.

Mean weight of natural adult spring chinook salmon that migrated as yearling smolts was estimated at 1.5 kg for age-3 jacks and ranged from 4.2-7.2 kg for age-4 adults and 6.1-9.3 kg for age-5 adults (Table 78-80). Mean weight for Deschutes stock hatchery spring chinook salmon ranged from 1.6-2.1 kg for age-3 jacks and 4.3-5.1 kg for age-4 adults, and was estimated at 8.7 kg for age-5 adults (Tables 78-80). The previous summaries are based on means calculated from sample sizes greater than two adults.

Sex ratio as a percentage of females varied widely for age-4 and age-5 adult spring chinook salmon (Table 81). Age-4 and older natural and hatchery adults returned mostly as females (Table 81).

JACK AND ADULT FALL CHINOOK SALMON

Migration Timing

Natural fall chinook salmon begin entering the Powerdale Dam trap in early July and stray hatchery fall chinook salmon begin entering the trap from early July to late September (Table 82). Median date of migration occurred between the last two weeks of July and the last two weeks of September for the natural run, and from early August to late September for the stray hatchery run. Both natural and stray hatchery components of the run were completed by early November (Table 82).

Harvest and Escapement

No fall chinook salmon were harvested from the 2000 run year (Table 83). Two unmarked fall chinook salmon were caught and released in early November from the 2002 run year (Table 84). No stray fall chinook salmon were harvested in either the 2000 or 2001 run years. Run year specific estimates of harvest are summarized in Appendix Table F-4 for the 1996-2001 run years.

Escapements to the Powerdale Dam trap ranged from 6-36 natural and 0-10 stray hatchery fall chinook salmon for the 1992-2001 run years (Table 85).

Age Composition, Size, and Sex Ratio

Scale analysis indicates that naturally produced fall chinook salmon primarily migrate as sub-yearling smolts and return as four and five year old adults (Table 86). Mean fork length of natural fall chinook salmon, that migrated as sub-yearling smolts, ranged from 61-78 cm for age-3 adults, 73-90 cm for age-4 adults, and from 88-89 cm for age-5 adults (Tables 87-89). Mean weight of natural fall chinook salmon, that migrated as sub-yearling smolts, ranged from 3.1-6.0 kg for age-3 adults, 5.9-8.7 kg for age-4 adults, and 8.4-9.4 kg for age-5 adults (Tables 90-92). The previous summaries are based on means calculated from sample sizes greater than two adults.

Sex ratio as a percentage of females varied widely for age-4 and age-5 adult fall chinook salmon (Table 93). Age-4 and older natural adults returned mostly as females (Table 93).

JACK AND ADULT COHO SALMON

Migration Timing

Natural coho salmon begin entering the Powerdale Dam trap as early as the first two weeks of September (Table 94). The median date of migration for natural coho salmon occurred around late September to late October (Table 94). The natural run was completed by mid- November to early December. The early entry time of natural coho salmon suggests returns may be progeny of hatchery strays (*see* Olsen et al. 1995). No information is available to test this hypothesis because of the lack of any information on the temporal distribution of migration for the original wild run of coho salmon in the Hood River subbasin.

Harvest and Escapement

No coho salmon were harvested from the 2000 run year (Table 95). Six coho salmon were harvest in early November from the 2001 run year (Table 96).

Escapements to the Powerdale Dam trap ranged from 0-24 natural and 7-996 stray hatchery coho salmon for the 1992-2001 run years, (Table 97).

Age composition, Size, and Sex Ratio

To date, virtually all natural coho salmon escaping to the Powerdale Dam trap have been adults (Tables 97-98). One natural jack coho salmon was recovered at the Powerdale Dam trap in 2000 and four natural jack coho salmon were recovered at the Powerdale Dam trap in 2001. Mean fork length was estimated at 38 cm for natural jack coho salmon and ranged from 58-71 cm for natural adult coho salmon (Tables 99-101). Mean weight was estimated at 0.7 kg for natural jack coho salmon and ranged from 2.5-4.8 kg for natural adult coho salmon (Tables 102-104). Sex ratio, as a percentage of females,

ranged from 0-75 percent for natural adult coho salmon (Table 105). The previous summaries are based on means calculated from sample sizes greater than two adults.

HATCHERY PRODUCTION

Introduction

The present day HRPP was designed in part based on procedures and guidelines established from a hatchery winter steelhead program first implemented by the Oregon Department of Fish and Wildlife (ODFW) in the fall of 1990. The ODFW's fledgling hatchery winter steelhead program had two primary objectives. They were to 1) collect biological data critical to developing and implementing the HRPP, which at the time was under consideration for BPA funding and 2) determine the feasibility of implementing the subbasins hatchery winter steelhead program with hatchery broodstock collected from the indigenous wild population. The ODFW hatchery program was successful in achieving both objectives but lacked the facilities to achieve the desired production numbers. The hatchery winter steelhead program was subsequently subsumed by the Hood River Production Program (HRPP) upon its implementation in August 1992.

Bonneville Power Administration, within the framework of the HRPP, provided funding to design, construct, and operate the facilities needed to fully implement the hatchery summer and winter steelhead and spring chinook salmon programs as proposed for the Hood River subbasin in the Hood River master plans (O'Toole and ODFW 1991a, O'Toole and ODFW 1991b, and Smith and CTWSRO 1991). Hatchery facilities that were funded by BPA primarily included: 1) an adult collection facility at Powerdale Dam (Figure 1); 2) an adult holding pond and spawning facility near the city of Parkdale (Figure 1); 3) incubation facilities at Parkdale, Oak Springs Hatchery (OSH), and Round Butte Hatchery (RBH); 4) juvenile rearing facilities at OSH and Pelton ladder; and 5) acclimation ponds in the West, Middle, and East forks of the Hood River subbasin (Figure 1). Oak Springs Hatchery, Round Butte Hatchery, and Pelton ladder are satellite hatchery facilities located in the Deschutes River subbasin. Construction of the HRPP's hatchery facilities was completed by the

fall of 1998. A description of how the HRPP has evolved into the present day program is provided in Olsen et al. (1994), Olsen et al. (1995), and Olsen et al. (1996).

Broodstock Collection

Indigenous populations of wild summer and winter steelhead in the Hood River subbasin are currently supplemented with hatchery smolts under the umbrella of the HRPP. The hatchery winter steelhead program was the first to be implemented with collection of hatchery broodstock from the 1990-1991 run year. The hatchery summer steelhead program was implemented beginning with the collection of wild summer steelhead from the 1997-1998 run year. The hatchery summer steelhead program was implemented at the later date primarily because the HRPP's hatchery facilities were not yet complete, but because it also provided the opportunity to fully develop the hatchery winter steelhead program before attempting to implement an additional program.

The HRPP implemented the hatchery summer steelhead program using the Hood River subbasins indigenous population of wild summer steelhead for hatchery broodstock. Hatchery broodstock was collected entirely from wild summer steelhead escaping to the Powerdale Dam trap in the 1997-1998 through 2000-2001 run years; with the exception of three unmarked male hatchery summer steelhead inadvertently collected for hatchery broodstock from the 1998-1999 run year (Table 106). Eggs fertilized by these males were subsequently discarded.

The number of female adult summer steelhead used for hatchery broodstock ranged from 7-14 and the number of eggs collected ranged from 30,218-63,161 (1998-2001 broods; Table 106). The total number of adult summer steelhead used for hatchery broodstock ranged from 9-25 (1998-2001 broods; Table 106). Hatchery broodstock was collected randomly from throughout the entire run.

The precursor to the current hatchery winter steelhead program in the Hood River subbasin was first implemented on a limited scale in the fall of 1990. Hatchery broodstock was collected from both wild and Big Creek stock hatchery winter steelhead escaping to the Powerdale Dam trap in the 1990-1991 run year.

The hatchery program discontinued utilizing Big Creek stock hatchery winter steelhead for broodstock after the first year of the program. The HRPP developed the program's current hatchery winter steelhead broodstock entirely from wild winter steelhead escaping to the Powerdale Dam trap in the 1991-1992 through 1994-1995 run years. Hood River stock hatchery winter steelhead escaping to the Powerdale Dam trap were first incorporated into the hatchery broodstock beginning with the 1995-1996 run year (*see* Olsen et al. 1996). The HRPP continued to utilize Hood River stock hatchery winter steelhead for hatchery broodstock through the 1999-2000 run year. The HRPP's hatchery guidelines restricted the number of Hood River stock hatchery winter steelhead used for hatchery broodstock to a maximum of 50% of both the total number of males and females used for hatchery broodstock. Hatchery guidelines were developed in 2000 and 2001 prohibiting the use of Hood River stock hatchery winter steelhead in developing the hatchery broodstock for the 2001 brood. However, four unmarked hatchery female winter steelhead were inadvertently used for hatchery broodstock collected for the 2001 brood (Table 107). The HRPP's current hatchery guidelines continue to stipulate that all winter steelhead used for hatchery broodstock will be collected from the wild component of the run. Protocols were established, subsequent to collection of broodstock for the 2001 brood, to minimize the potential for incorporating unmarked hatchery adults into the hatchery broodstock.

The number of female adult winter steelhead used for hatchery broodstock ranged from 3-29 and the number of eggs collected ranged from 11,858-112,302 (1991-2001 broods; Table 107). The total number of adult winter steelhead used for hatchery broodstock ranged from 4-62 (1991-2001 broods; Table 107). Hatchery broodstock was collected randomly from throughout the entire run.

Production Releases

Numbers of hatchery steelhead smolts released into the Hood River subbasin ranged from 49,278 to 99,973 Foster stock summer steelhead (1987-2000 broods), from 19,513 to 37,665 Hood River stock summer steelhead (1998-2000 broods), and from 38,034 to 63,182 Hood River stock winter steelhead (1992-2000 broods; Tables 108 and 109).

Numbers of hatchery spring chinook salmon smolts released into the Hood River subbasin ranged from 125,432 to 197,988 Carson stock spring chinook salmon (1986-1990 broods) and from 75,205 to 170,004 Deschutes stock spring chinook salmon (1991 and 1993-1999 broods; Table 110). No spring chinook salmon smolts were released into the Hood River subbasin from the 1992 brood (*see* Olsen et al. 1995).

The HRPP releases all hatchery summer and winter steelhead and spring chinook salmon as full term smolts. Annual production releases for summer and winter steelhead and spring chinook salmon are currently maintained at a level that is significantly lower than the HRPP's proposed target levels. The hatchery programs have been operated below the HRPP's proposed target production levels due to the combined problems associated with 1) the low escapements of wild adult summer and winter steelhead and 2) the staggered time frame associated with bringing all the HRPP's hatchery production facilities on line.

Hatchery operation guidelines currently restrict the number of wild summer and winter steelhead that can be collected for hatchery broodstock to a maximum of 25% of the wild run escaping to Powerdale Dam. The low escapements of wild summer and winter steelhead in the 1993-1994 through 1998-1999 run years made it difficult in most run years to collect sufficient numbers of wild adults to achieve the HRPP's target production level and still follow the above guideline. No similar guideline restricted the collection of natural spring chinook salmon for hatchery broodstock because the hatchery guideline only applies to indigenous populations of wild fish. The indigenous population of wild spring chinook salmon was deemed to have gone extinct and one goal of the HRPP is to restore a self sustaining population in the Hood River. The primary problem associated with the hatchery spring chinook salmon program is that the combined escapements of natural and hatchery spring chinook salmon are insufficient to achieve both the annual subbasin spawner escapement objective and still meet the hatchery programs broodstock collection needs.

The chronically low annual escapements of wild summer and winter steelhead and natural and hatchery spring chinook salmon to the Hood River subbasin

necessitated the development of interim hatchery production levels that would achieve the biological goals of the HRPP while still providing recreational harvest opportunities in sport and tribal fisheries. The interim production levels were designed in such a manner that all three hatchery programs could be implemented while the HRPP's hatchery production facilities were systematically being brought on line. To meet this criteria, the proposed interim production level for the HRPP was set at 60,000 Foster stock summer steelhead; 20,000 Hood River stock summer steelhead; 30,000 Hood River stock winter steelhead; and 125,000 Deschutes stock spring chinook salmon smolts. The HRPP would continue to release Foster stock hatchery summer steelhead smolts under the above scenario until annual production releases of Hood River stock hatchery summer steelhead smolts could be sustained at levels which would result in adult returns sufficient to meet both the harvest and spawner escapement objectives. Foster stock hatchery summer steelhead smolts would be released below Powerdale Dam under this proposal, and no returning adults would be passed above Powerdale Dam (*see* **ADULT SUMMER STEELHEAD**, **Migration, Escapement, and Survival**). The HRPP's proposed target production level at full implementation is 150,000 Hood River stock summer steelhead; 85,000 Hood River stock winter steelhead; and 250,000 Deschutes stock spring chinook salmon smolts (O'Toole and ODFW 1991a).

Juvenile hatchery summer and winter steelhead are reared at OSH. Hatchery spring chinook salmon were entirely reared at Round Butte Hatchery beginning with the 1993 brood. Juvenile hatchery spring chinook salmon from the 1994 brood were the first to be finish reared in the newly completed Pelton ladder facility. Acclimation facilities were used to hold smolts prior to their volitional release into the Hood River subbasin beginning with the 1998 brood release of Hood River stock summer steelhead (Table 29), the 1995 brood release of Hood River stock winter steelhead (Table 52), and the 1994 brood release of Deschutes stock spring chinook salmon (Table 73).

Post-Release Survival

A juvenile migrant trap was operated in the mainstem Hood River (RM 4.5) to estimate numbers of downstream migrant hatchery steelhead smolts leaving the Hood River subbasin. Estimates ranged from 9,272 to 37,324 summer

steelhead smolts and 11,089 to 52,412 winter steelhead smolts from the 1993-2000 brood releases (Table 111). The estimated number of migrants passing the mainstem migrant trap, as a percentage of the total production release, ranged from 31.0% to 86.2% for hatchery summer steelhead smolts and from 25.9% to 93.1% for hatchery winter steelhead smolts (Table 111). The percentages increased markedly beginning with the 1998 brood release of Hood River stock summer steelhead and the 1995 brood release of Hood River stock winter steelhead (Table 111). Both hatchery brood releases were the first to be acclimated prior to their volitional release into the Hood River subbasin, and it is believed that this release strategy may have been the primary factor contributing to the increase.

The recapture rate on smolts that were both marked and released at the mainstem migrant trap was consistently lower for both hatchery summer and winter steelhead than for wild rb-st; with the one exception of hatchery summer steelhead marked and released in 1999 (Appendix Table A-1). The lower recapture rate for hatchery summer and winter steelhead smolts is believed to be caused by a combination of 1) a significantly higher rate of handling mortality on hatchery fish and 2) altered migratory behavior caused by handling stress. This assumption is based on visual observation of the condition of downstream migrant hatchery smolts. Hatchery summer steelhead smolts sampled at the mainstem migrant trap from 1994-1997 generally appeared to be in much poorer condition than downstream migrant wild rb-st, and both hatchery summer and winter steelhead smolts were generally more susceptible to handling stress (i.e., a higher rate of handling mortality). Both problems were particularly evident with the production releases of Skamania stock hatchery summer steelhead from 1994-1997. In particular, downstream migrant Skamania stock hatchery summer steelhead generally exhibited considerable descaling and many were observed with deformed opercles. The deformed opercle was unique to the Skamania stock hatchery summer steelhead production releases, and a typically low but unknown percentage of the hatchery smolts were observed with this deformity in each of the first four years we operated the mainstem and West Fork migrant traps.

A combination of both poor condition, as well as the stress associated with the hauling of hatchery fish for off station release into the Hood River

subbasin, is believed to put hatchery smolts at or near their level of tolerance for stress. The general quality of summer steelhead smolts appears to have benefitted from the use of Hood River stock wild summer steelhead as hatchery broodstock. The improved recapture rates observed from 1998-2001 (Appendix Table A-1) would also indicate that acclimation facilities are helping to minimize stress related problems associated with the transport of subbasin hatchery production from out-of-basin hatchery facilities to the Hood River subbasin. In general, however, the additional stress of trapping and handling at the migrant traps is believed to have increased either 1) the potential handling mortality or 2) the possibility of modifying migration behavior.

Any artificial reduction in the mark:recapture ratio would have the net effect of inflating the population estimate. To minimize the potential for biasing the population estimates for hatchery steelhead, the mark:recapture ratio for downstream migrant wild rb-st was used as the expansion factor for estimating numbers of downstream migrant hatchery summer and winter steelhead smolts migrating past the mainstem migrant trap in the 1995-1997 sampling seasons. The mark:recapture ratio for downstream migrant wild rb-st was used as the expansion factor based on the assumption that it more accurately reflected trapping efficiencies at the mainstem migrant trap. There was also no reason to assume that either hatchery production group should have a lower rate of recapture than the wild rb-st. This assumption was based on the fact that all three groups migrated past the mainstem migrant trap during the same time period. Using the mark:recapture ratio for downstream migrant wild rb-st to estimate numbers of downstream migrant hatchery summer and winter steelhead at the mainstem migrant trap also represents a more conservative approach for estimating hatchery production leaving the Hood River subbasin. Race specific hatchery mark:recapture ratio's were used in 1994 and from 1997-2000 to estimate numbers of hatchery summer and winter steelhead smolts passing the mainstem migrant trap.

Size and Weight

Mean length, weight, and condition factor were estimated for early and late release groups of Hood River stock hatchery summer steelhead and early

and late release groups of small- and large- sized groups of hatchery winter steelhead. Both hatchery production groups were reared at Oak Springs Hatchery (OSH). Hatchery winter steelhead production at OSH was graded into the two size groups prior to marking the juveniles in late October. The two groups were classified as small- and large-sized fish and were comparable to small- and large- sized groups sampled from previous broods. Juveniles from the last hatchery production spawning in 1993 (i.e., 9 June 1993; *see* Olsen et al. 1995) were markedly smaller than juveniles in the rest of the hatchery production groups so they were held separately in a small circular tank. Juveniles from the 9 June, 1993 spawning were released on 28 June, 1994 and were not assigned a size category. No similar situation occurred with the other brood releases.

Small- and large-sized groups of hatchery winter steelhead were reared in separate raceways at OSH. Hatchery production was graded into the two size groups to provide hatchery personnel the ability to implement a modified feeding schedule targeting the smaller juveniles in the production group. The modified feeding schedule was designed to accelerate the growth of smaller juveniles so that the entire production group would be more uniformly smolt-sized upon release into the Hood River subbasin.

Mean fork length of Hood River stock hatchery summer steelhead smolts ranged from 170-202 mm (1998-2000 broods; Table 112). Mean condition factor for Hood River stock hatchery summer steelhead was markedly higher in the year of release than for the corresponding calender year estimates for downstream migrant wild rb-st sampled at the mainstem migrant trap (*see* **JUVENILE RAINBOW-STEELHEAD**, **Size and Weight**). Mean condition factor for Hood River stock hatchery summer steelhead smolts, sampled at OSH, ranged from 1.02-1.17 (1998-2000 broods; Table 112). Mean condition factor for age-2 wild rb-st, sampled at the mainstem migrant trap, ranged from 0.97-0.99 (1999-2001 year of migration; Table 12). Mean condition factor for Hood River stock hatchery summer steelhead smolts, sampled at the mainstem migrant trap, ranged from 0.94-0.99 (1998-2000 broods; Table 114). Length x weight regressions for early and late size groups of hatchery summer steelhead are presented in Figures 12 and 13.

Mean fork length of Hood River stock hatchery winter steelhead smolts, sampled at OSH prior to release, ranged from 168-200 mm (1993-2000 broods; Table 113). Mean condition factor for Hood River stock hatchery winter steelhead was markedly higher in the year of release than for the corresponding calender year estimates for downstream migrant wild rb-st sampled at the mainstem migrant trap (*see* **JUVENILE RAINBOW-STEELHEAD**, **Size and Weight**). Mean condition factor for Hood River stock hatchery winter steelhead smolts, sampled at OSH, ranged from 1.04-1.19 (1993-2000 broods; Table 113). Mean condition factor for age-2 wild rb-st, sampled at the mainstem migrant trap, ranged from 0.94-1.02 (1994-2001 year of migration; Table 12). Mean condition factor for Hood River stock hatchery winter steelhead smolts, sampled at the mainstem migrant trap, ranged from 0.95-1.03 (1994-2000 broods; Table 114). Length x weight regressions for early and late size groups of hatchery winter steelhead are presented in Figures 14 and 15.

STREAMFLOWS

In 2000 and 2001, staff gauges were used to monitor streamflows from early April to early November in the West, Middle, and East forks of the Hood River; in Lake Branch; and in Tony and Neal creeks (Figures 16-22). Estimates of discharge (ft^3/sec) ranged from 7-141 cfs, 38-509 cfs, and 26-578 cfs in the West, Middle, and East forks of the Hood River, respectively (Figures 16 and 18). Estimates of discharge ranged from 28-762 cfs, 3-76 cfs, and 11-61 cfs in Lake Branch, Tony Creek, and Neal Creek, respectively (Figures 17 and 19).

The Oregon Water Resources Department (OWRD) holds an In-stream Water Right (IWR) on the East Fork Hood River in trust for the people of Oregon. The IWR was granted for the purpose of supporting aquatic life and minimizing pollution. The IWR measurement point is slightly upstream of the confluence of the East and Middle forks of the Hood River and establishes a minimum flow for specific time periods of the year (Table 115; Olsen et al. 1995).

No permanent gauging station exists at the site of the IWR, that can be used to monitor whether or not the IWR is being met. Observations made prior to 1994 indicated that the IWR was probably not being met during certain times of the year. A gauging station was installed in the East Fork of the Hood

River in 1992, by the OWRD, and jointly monitored by both the OWRD and the ODFW from 1992-1994 (Olsen et al. 1995) and by ODFW from 1996-1999. Data collected to date indicates that the IWR is not always being met, at least during periods when the gauging station was monitored (Figures 20-22; Olsen et al. 1995). This was particularly the case from 1992-1994 and in 2001 when streamflows during the summer months were typically well below the IWR (Figures 20 and 22; Olsen et al. 1995). Flows during the summer months of 1998-2000 fluctuated around the IWR (Figures 21 and 22). Full benefits associated with the HRPP may not be completely realized unless the IWR is met on an annual basis.

SUMMARY

This report summarizes the life history and production data collected in the Hood River subbasin during FY 2000 and 2001. Included is a summary of jack and adult life history data collected at the Powerdale Dam trap on ten complete run years of winter steelhead, spring and fall chinook salmon, and coho salmon, and on nine complete run years of summer steelhead. Also included are summaries of 1) the hatchery winter steelhead broodstock collection program; 2) hatchery production releases in the Hood River subbasin; 3) subbasin wild summer and winter steelhead smolt production, 4) numbers of hatchery summer and winter steelhead smolts leaving the subbasin; 5) wild and hatchery steelhead smolt to adult survival rates; 6) wild summer and winter steelhead egg to smolt survival rates; and 7) streamflow at selected locations in the Hood River subbasin. Data will be used in part to 1) evaluate the HRPP with respect to its impact on indigenous populations of resident and anadromous salmonids, 2) refine spawner escapement objectives to more accurately reflect subbasin carrying capacity, and 3) refine estimates of subbasin smolt production capacity to more accurately reflect current and potential subbasin carrying capacity.

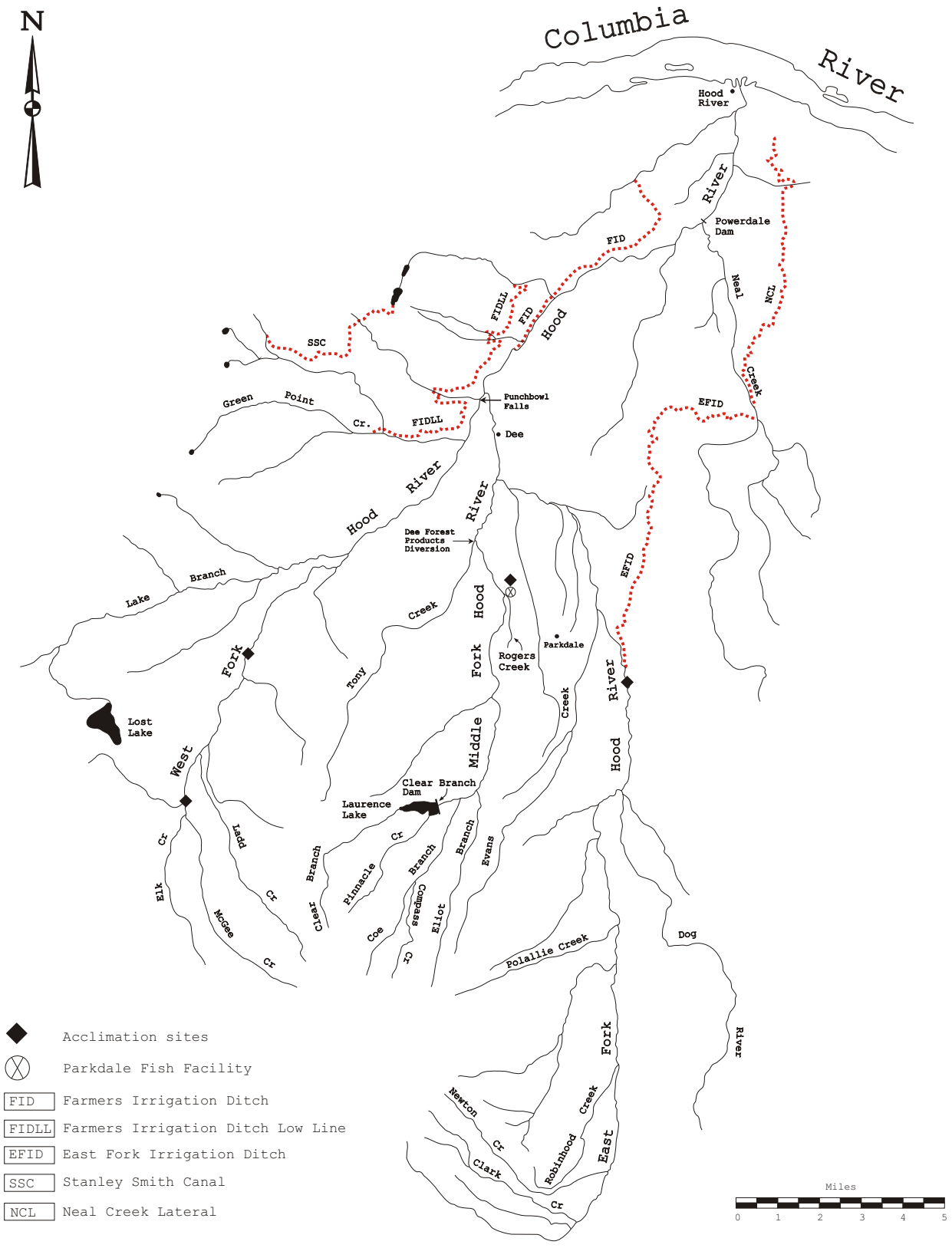

Figure 1. Map of the Hood River subbasin.

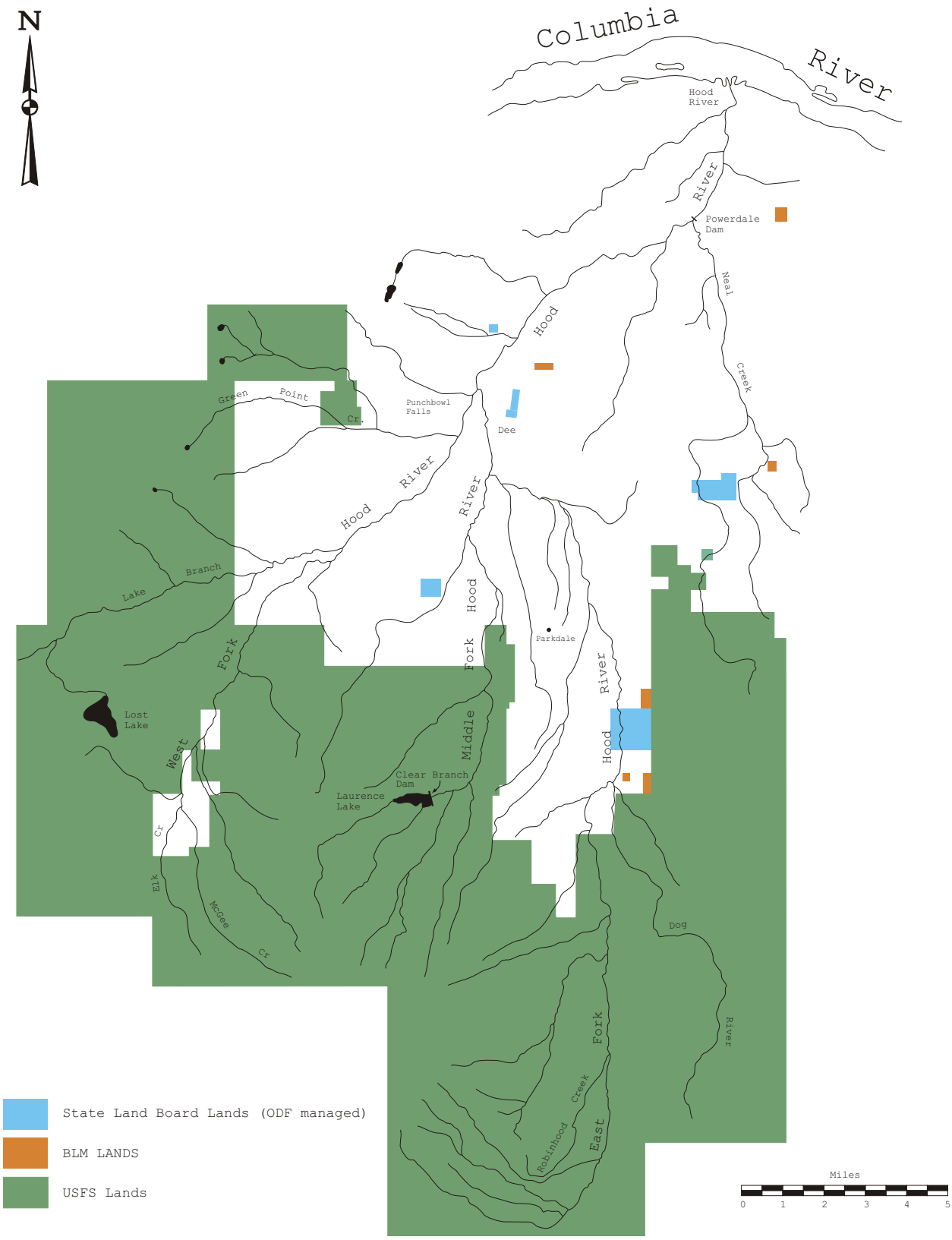

Figure 2. Location of public lands in the Hood River subbasin.

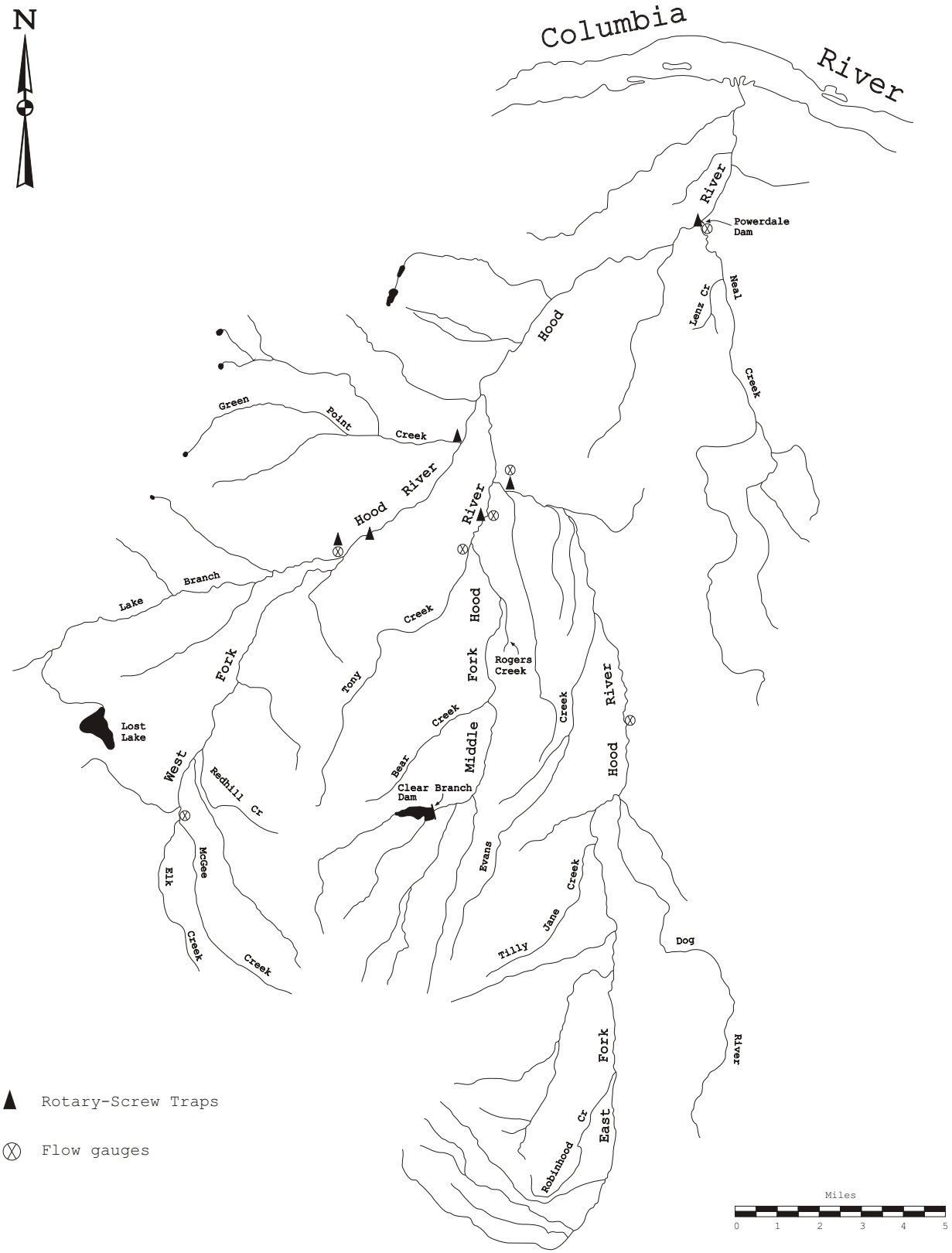

Figure 3. Location of sampling sites in the Hood River subbasin.

Table 3. Estimated number of wild downstream migrant rainbow-steelhead to a migrant trap located at RM 4.5 in the mainstem Hood River, by age category. Estimate is for migrants greater than or equal to 150 mm fork length. (Percent of total migrants is in parentheses. Population estimators and sampling periods are in **APPENDIX A**.)

Year	Estimated number[a] of migrants	95% C.I.	Estimated number by age category[b,c] Age 1	Age 2	Age 3	Age 4
1994	9,554	4,314 - 14,794	2,201 (23.0)	6,340 (66.4)	1,013 (10.6)	0 (0)
1995	5,955	*d* - 13,783	1,326 (22.3)	3,627 (60.9)	1,002 (16.8)	0 (0)
1996	8,755	6,188 - 11,322	1,090 (12.5)	6,140 (70.1)	1,501 (17.1)	23 (0.3)
1997	15,972	10,996 - 20,948	2,120 (13.3)	11,967 (74.9)	1,885 (11.8)	0 (0)
1998	31,035	22,801 - 39,269	1,622 (5.2)	26,852 (86.5)	2,561 (8.3)	0 (0)
1999	23,942	17,213 - 30,671	87 (0.4)	21,003 (87.7)	2,852 (11.9)	0 (0)
2000	19,266	15,191 - 23,341	503 (2.6)	12,285 (63.8)	6,450 (33.5)	28 (0.1)
2001	6,804[e]	*d* - 14,579	107 (1.6)	4,072 (59.8)	2,578 (37.0)	107 (1.6)

[a] Estimates do not include juvenile steelhead migrants from Neal Creek, a major mainstem Hood River tributary draining into a side channel opposite the mainstem migrant trap (*see* Figure 3). Limited migrant trapping at the mouth of Neal Creek indicates this creek produces approximately 300-800 downstream migrant rainbow-steelhead.

[b] No age 0 migrants have been sampled that were greater than or equal to 150 mm fork length.

[c] Estimates of freshwater age 1 and age 2 migrants may include unmarked hatchery smolts.

[d] Lower limit computes to less than zero.

[e] The estimate of downstream migrant rainbow-steelhead (rb-st) was based on the combined mark and recapture numbers for wild rb-st and hatchery summer and winter steelhead smolts.

Table 4. Estimated number of wild downstream migrant rainbow-steelhead, by age category, to migrant traps located in the West, Middle, and East forks of the Hood River and to Lake Branch and Green Point Creek; both of which are tributaries to the West Fork of the Hood River. Estimate is for migrants greater than or equal to 150 mm fork length. (Percent of total migrants is in parentheses. Population estimators and sampling periods are in **APPENDIX A**.)

Location, year	Estimated number of migrants	95% C.I.	Estimated number by age category				
			Age 0	Age 1	Age 2	Age 3	Age 4
West Fork,[a]							
1994	3,550	1,803 - 5,297	23 (0.7)	1,787 (50.3)	1,693 (47.7)	47 (1.3)	0 (0)
1995	1,414	463 - 2,365	0 (0)	42 (2.9)	998 (70.6)	374 (26.5)	0 (0)
1996	958	24 - 1,892	0 (0)	15 (1.5)	634 (66.2)	309 (32.3)	0 (0)
1997	4,075[b]	*c* - 8,952	0 (0)	0 (0)	3,673 (90.1)	402 (9.9)	0 (0)
1998	3,716	352 - 7,080	0 (0)	148 (4.0)	2,300 (61.9)	1,268 (34.1)	0 (0)
1999	2,042	402 - 3,682	0 (0)	20 (1.0)	1,836 (89.9)	186 (9.1)	0 (0)
2000	1,760	890 - 2,630	0 (0)	14 (0.7)	739 (42.0)	967 (55.0)	40 (2.3)
2001	667[d]	*c* - 1,923	0 (0)	0 (0)	333 (50.0)	334 (50.0)	0 (0)
Middle Fork,							
1995	1,180	526 - 1,834	0 (0)	81 (6.8)	978 (82.9)	121 (10.3)	0 (0)
1996	1,050	439 - 1,661	0 (0)	88 (8.3)	700 (66.7)	262 (25.0)	0 (0)
1997	2,673	1,894 - 3,452	0 (0)	16 (0.6)	2,564 (95.9)	93 (3.5)	0 (0)
1998	2,055[e]	939 - 3,171	0 (0)	21 (1.0)	1,929 (93.9)	84 (4.1)	21 (1.0)
1999	3,228[f]	1,463 - 4,993	0 (0)	35 (1.1)	2,737 (84.8)	456 (14.1)	0 (0)
2000	378	*c* - 1,728	0 (0)	0 (0)	181 (47.8)	197 (52.2)	0 (0)
2001	1,397[f]	*c* - 4,135	0 (0)	0 (0)	1,204 (86.2)	193 (13.8)	0 (0)
East Fork,							
1994	1,618	1,187 - 2,049	9 (0.6)	667 (41.2)	869 (53.7)	73 (4.5)	0 (0)
1995	2,224	432 - 4,016	0 (0)	641 (28.8)	1,451 (65.3)	132 (5.9)	0 (0)
1996	*g*						
1997	1,566	1,062 - 2,070	0 (0)	69 (4.4)	1,456 (93.0)	41 (2.6)	0 (0)
1998	1,873	374 - 3,372	0 (0)	59 (3.2)	1,774 (94.7)	40 (2.1)	0 (0)
1999	3,297	1,465 - 5,129	0 (0)	0 (0)	2,877 (87.3)	420 (12.7)	0 (0)
2000	2,987	1,047 - 4,927	0 (0)	22 (0.7)	2,246 (75.2)	719 (24.1)	0 (0)
2001	*h*						
Green Point Creek,							
1998	78	*c* - 318	0 (0)	8 (10.0)	62 (80.0)	8 (10.0)	0 (0)
1999	277	62 - 492	0 (0)	0 (0)	146 (52.6)	124 (44.8)	7 (2.6)
2000	288[i]	192 - 384	0 (0)	0 (0)	136 (47.1)	152 (52.9)	0 (0)
2001	161	2 - 320	0 (0)	0 (0)	10 (6.2)	151 (93.8)	0 (0)
Lake Branch,							
1997	855	*c* - 2,060	0 (0)	0 (0)	646 (75.6)	209 (24.4)	0 (0)
1998	1,329	168 - 2,490	0 (0)	20 (1.5)	952 (71.6)	357 (26.9)	0 (0)
1999	954	642 - 1,266	0 (0)	7 (0.8)	794 (83.2)	145 (15.2)	8 (0.8)
2000	252	30 - 474	0 (0)	0 (0)	104 (41.2)	148 (58.8)	0 (0)

Table 4. Continued.

Location, year	Estimated number of migrants	95% C.I.	Estimated number by age category				
			Age 0	Age 1	Age 2	Age 3	Age 4
Lake Branch, (cont.)							
2001	216	*c* - 493	0 (0)	0 (0)	98 (45.5)	118 (54.5)	0 (0)

[a] Estimates at the West Fork trap include numbers migrating from Lake Branch.

[b] Estimate derived based on mark and recapture ratio of migrants marked at the Lake Branch migrant trap and recaptured at the West Fork trap.

[c] Lower limit computes to less than zero.

[d] Estimate based on the mark and recapture ratio of wild steelhead (i.e., migrants ≥150 mm fork length) and hatchery summer steelhead caught at the migrant trap.

[e] Estimate based on the mark and recapture ratio of all wild steelhead (i.e., migrants <150 mm fork length and migrants ≥150 mm fork length) and bull trout caught at the migrant trap.

[f] Estimate based on the mark and recapture ratio of wild steelhead (i.e., migrants ≥150 mm fork length) and hatchery winter steelhead caught at the migrant trap.

[g] No estimate available. The migrant trap was moved to a new site in 1996; at a landowners request. This site proved to be a poor site for collecting downstream migrants. The migrant trap was moved back to our standard sampling site around mid-summer.

[h] Trap was not operated due to extremely heavy movement of glacial silt and sand discharged from the Newton Creek glacier subsequent to its blowout in September, 2000.

[i] Estimate based on the mark and recapture ratio of all downstream migrant steelhead (i.e., migrants <150 mm fork length and migrants ≥150 mm fork length).

Table 5. Estimated number of wild steelhead smolts migrating from the Hood River subbasin, by age category. (Percent of total migrants is in parentheses.)

Year	Estimated number[a] of smolts	Freshwater age			
		Age 1	Age 2	Age 3	Age 4
1994	7,573	1,233 (16.3)	5,327 (70.3)	1,013 (13.4)	0 (0)
1995	4,656	839 (18.0)	2,978 (64.0)	839 (18.0)	0 (0)
1996	6,799	841 (12.4)	4,707 (69.2)	1,228 (18.1)	23 (0.3)
1997	13,334	1,414 (10.6)	10,177 (76.3)	1,743 (13.1)	0 (0)
1998	25,485	896 (3.5)	22,284 (87.4)	2,305 (9.1)	0 (0)
1999	18,842	86 (0.5)	16,033 (85.1)	2,723 (14.4)	0 (0)
2000	14,882	335 (2.2)	8,851 (59.5)	5,668 (38.1)	28 (0.2)
2001	5,786	107 (1.8)	3,215 (55.6)	2,357 (40.7)	107 (1.9)

[a] Estimates do not include juvenile steelhead migrants from Neal Creek, a major mainstem Hood River tributary draining into a side channel opposite the mainstem migrant trap (*see* Figure 3). Radio telemetry studies, and limited migrant trapping at the mouth of Neal Creek, indicates the creek produces approximately 200-700 downstream migrant winter steelhead smolts.

Table 6. Brood year specific estimates of wild and hatchery adult summer and winter steelhead spawner escapements (i.e., above Powerdale Dam) and subbasin smolt production in the Hood River subbasin. Brood years are bold faced for those years in which race specific estimates of smolt production are complete. Estimates of egg to smolt survival (%) are in parenthesis.

Species, brood year[a]	Numbers passed above the Powerdale Dam trap			Smolt production[c,d]	Smolt Production by Freshwater age category			
	Males	Females	Total[b]		Age 1	Age 2	Age 3	Age 4
Summer steelhead,								
1990		--		*e*	--	--	--	0
1991		--		*e*	--	--	434	0
1992		--		*e*	--	2,026	280	11
1993	671	1,542	2,213	1,165 (0.02)	165	575	425	0
1994	438	910	1,348	2,750 (0.10)	419	1,673	658	0
1995	757	1,096	1,853	5,634 (0.16)	561	3,809	1,264	0
1996	259	393	652	3,745 (0.30)	354	2,743	634	14
1997	562	932	1,494	10,005 (0.34)	489	5,608	3,854	54
1998	173	339	512	*f*	22	6,715	--	--
1999	26	78	104	*f*	335	--	--	--
2000	56	92	148	*f*	--	--	--	--
2001	37	141	178	*f*	--	--	--	--
Winter steelhead,								
1990		--		*e*	--	--	--	0
1991		--		*e*	--	--	579	0
1992		--		*e*	--	3,301	559	12
1993	129	226	355	4,274 (0.57)	1,068	2,403	803	0
1994	92	214	306	4,539 (0.64)	420	3,034	1,085	0
1995	82	84	166	7,689 (2.75)	280	6,368	1,041	0
1996	173	200	373	22,704 (3.41)	1,060	19,541	2,089	14
1997	190	301	491	12,699 (1.27)	407	10,425	1,814	53
1998	123	223	346	*f*	64	2,136	--	--
1999	185	259	444	*f*	0	--	--	--
2000	447	649	1,096	*f*	--	--	--	--
2001	614	926	1,540	*f*	--	--	--	--

[a] Race specific estimates of smolt production for the 1995-1997 broods are preliminary estimates and subject to change as adult returns from the corresponding brood near completion (*see* **Methods**).

[b] Numbers include fish that were initially recycled but later passed above Powerdale Dam, either by accident or by design.

[c] Estimates of winter steelhead smolt production do not include numbers migrating from Neal Creek, a major mainstem Hood River tributary draining into a side channel opposite the mainstem migrant trap. It is estimated that up to at least 5% of the wild adult winter steelhead passed above Powerdale Dam may migrate into Neal Creek. This hypothesis is based on radio telemetry studies conducted from 1994-1996.

[d] Egg to smolt survival is based on an average fecundity of 3,500 eggs per female and an estimated pre-spawning mortality of 10% for summer steelhead and 5% for winter steelhead.

[e] Brood year specific estimates of subbasin smolt production cannot be made prior to the 1993 brood.

[f] Brood year specific estimates of subbasin smolt production are incomplete.

Table 7. Estimated number of wild steelhead smolts, by age category, to migrant traps located in the West, Middle, and East forks of the Hood River and to Lake Branch and Green Point Creek; both of which are tributaries to the West Fork of the Hood River. (Percent of total migrants is in parentheses.)

Location, year	Estimated number of smolts	Freshwater age			
		Age 1	Age 2	Age 3	Age 4
West Fork,[a]					
1994	2,210	917 (41.5)	1,270 (57.5)	23 (1.0)	0 (0)
1995	776	14 (1.8)	416 (53.6)	346 (44.6)	0 (0)
1996	752	15 (2.0)	442 (58.8)	295 (39.2)	0 (0)
1997	2,314	0 (0)	1,912 (82.6)	402 (17.4)	0 (0)
1998	3,008	29 (1.0)	1,740 (57.8)	1,239 (41.2)	0 (0)
1999	1,052	21 (2.0)	887 (84.3)	144 (13.7)	0 (0)
2000	1,236	14 (1.1)	349 (28.2)	833 (67.4)	40 (3.3)
2001	334	0 (0)	134 (40.1)	200 (59.9)	0 (0)
Middle Fork,					
1995	928	71 (7.7)	736 (79.3)	121 (13.0)	0 (0)
1996	875	44 (5.0)	623 (71.2)	208 (23.8)	0 (0)
1997	2,440	0 (0)	2,347 (96.2)	93 (3.8)	0 (0)
1998	1,552	0 (0)	1,447 (93.2)	84 (5.4)	21 (1.4)
1999	1,825	35 (1.9)	1,404 (76.9)	386 (21.2)	0 (0)
2000	312	0 (0)	115 (36.9)	197 (63.1)	0 (0)
2001	1,060	0 (0)	964 (90.9)	96 (9.1)	0 (0)
East Fork,					
1994	1,134	293 (25.9)	768 (67.7)	73 (6.4)	0 (0)
1995	1,772	396 (22.3)	1,244 (70.2)	132 (7.5)	0 (0)
1996	*b*	--	--	--	--
1997	1,236	41 (3.3)	1,154 (93.4)	41 (3.3)	0 (0)
1998	1,045	40 (3.8)	966 (92.4)	39 (3.8)	0 (0)
1999	1,978	0 (0)	1,618 (81.8)	360 (18.2)	0 (0)
2000	2,246	22 (1.0)	1,550 (69.0)	674 (30.0)	0 (0)
2001	*c*	--	--	--	--
Green Point Creek,					
1998	23	0 (0)	15 (65.2)	8 (34.8)	0 (0)
1999	73	0 (0)	0 (0)	66 (90.4)	7 (9.6)
2000	85	0 (0)	17 (20.0)	68 (80.0)	0 (0)
2001	40	0 (0)	0 (0)	40 (100)	0 (0)
Lake Branch,					
1997	475	0 (0)	361 (76.0)	114 (24.0)	0 (0)
1998	972	0 (0)	674 (69.3)	298 (30.7)	0 (0)
1999	557	0 (0)	443 (79.5)	107 (19.2)	7 (1.3)
2000	215	0 (0)	89 (41.4)	126 (58.6)	0 (0)
2001	137	0 (0)	39 (28.5)	98 (71.5)	0 (0)

[a] Estimates at the West Fork trap include numbers migrating from Lake Branch.

[b] No estimate available. The migrant trap was moved to a new site in 1996; at a landowners request. This site proved to be a poor site for collecting downstream migrants. The migrant trap was moved back to our standard sampling site around mid-summer.

[c] Trap was not operated due to extremely heavy movement of glacial silt and sand discharged from the Newton Creek glacier subsequent to its blowout in September, 2000.

Table 8. Combined estimates of wild summer and winter steelhead subbasin smolt production, escapement to the mouth of the Hood River, and smolt to adult survival rate. Estimates are by year of migration. Year of migration is bold faced for those years in which estimates of adult escapements back to the mouth of the Hood River subbasin are more than 98% complete.

Year of smolt migration	Smolts	Adult returns		Smolt-adult survival
		Run years[a]	No.[b]	
1994	7,573	1994/95-1999/00	534	7.05
1995	4,656	1995/96-2000/01	440	9.45
1996	6,799	1996/97-2001/02	403	5.93
1997	13,334	1997/98-2001/02	488	3.66
1998	25,485	1998/99-2001/02	1,552	6.09
1999	18,842	1999/00-2001/02	1,184	6.28
2000	14,882	2000/01-2001/02	156	1.05

[a] Summer steelhead escapements in the 2001-2002 run year are preliminary estimates through 31 December, 2001. Winter steelhead returns are complete through the 2000-2001 run year.

[b] Hooking mortality was assumed to average approximately 10% in the sport fishery located from the mouth of the Hood River to Powerdale Dam.

Table 9. Combined returns of wild adult summer and winter steelhead to the Powerdale Dam trap, by brood year and freshwater age category. Brood years are bold faced for those years in which brood year specific estimates are more than 98% complete. Estimates are based on returns from the 1992-1993 through 2000-2001 summer steelhead run years and the 1991-1992 through 2000-2001 winter steelhead run years.

Brood year	Total returns	Freshwater age[a]			
		Age 1	Age 2	Age 3	Age 4
1985	*b*	--	-- (1)	0 (1)	0
1986	*b*	--	0 (16)	17 (7)	2
1987	*b*	0	129 (51)	212 (7)	0
1988	*b*	4	909 (29)	88 (9)	0
1989	568	16 (2)	432 (20)	97 (1)	0
1990	515	9	455 (19)	31 (1)	0
1991	319	4	246 (9)	56 (3)	1
1992	458	2 (1)	397 (10)	45 (3)	0
1993	416	15	321 (25)	52 (3)	0
1994	357	2	287 (16)	45 (6)	1
1995	508	3	342 (30)	121 (11)	1
1996	1,359	12	1,103 (126)	118	0
1997	*c*	11	616 (1)	16	--
1998	*c*	3	21	--	--
1999	*c*	0	--	--	--

[a] Numbers of repeat spawners are summarized in parenthesis. The estimated number of repeat spawners for a given brood year may include adult steelhead that were counted several times as a consequence of having returned to the Powerdale Dam trap in two or more run years.

[b] Complete brood year specific estimates of wild adult steelhead returns cannot be made prior to the 1989 brood.

[c] Preliminary estimates of wild adult steelhead returns by freshwater age category. Estimates do not include potential returns from all possible age categories of wild adult summer and winter steelhead.

Table 10. Mean fork length (mm) of downstream migrant wild rainbow-steelhead sampled prior to 1 August at migrant traps located in the mainstem Hood River; the West, Middle, and East forks of the Hood River; and in Lake Branch and Green Point Creek, both of which are tributaries to the West Fork of the Hood River. (Sampling periods are in **APPENDIX A.**)

Age, location, year	N	Fork length (mm) Mean	Range	95% C.I.
Age 0,				
Mainstem,				
1994	6	78.3	67 - 107	±15.6
1995	1	72	72	--
1997	3	72.7	69 - 77	±10.0
West Fork,				
1994	24	97.0	68 - 150	± 9.1
1998	1	69	69	--
Middle Fork,				
1995	1	62	62	--
East Fork,				
1994	72	96.9	63 - 179	± 3.9
1998	2	70.0	68 - 72	±25.4
Green Point Creek,				
2000	1	79	79	--
Age 1,				
Mainstem,				
1994	55	166.0	120 - 200	± 4.2
1995	45	168.7	77 - 216	± 7.1
1996	34	169.0	84 - 264	± 9.9
1997	56	151.8	83 - 200	± 9.1
1998	60	140.2	78 - 196	± 9.1
1999	4	128.2	98 - 187	±64.5
2000	30	149.1	90 - 186	± 9.5
2001	3	138.3	126 - 145	±26.6
West Fork,				
1994	83	166.0	128 - 194	± 2.6
1995	16	107.8	79 - 166	±14.3
1996	7	104.0	76 - 186	±34.1
1997	4	103.5	80 - 149	±49.5
1998	80	110.7	76 - 166	± 4.5
1999	12	88.9	68 - 122	±10.2
2000	4	112.5	83 - 180	±72.3
2001	2	85.0	82 - 88	±38.1
Middle Fork,				
1995	24	135.2	81 - 216	±17.3
1996	13	118.6	83 - 166	±15.1
1997	36	107.2	69 - 151	± 6.7
1998	82	96.6	62 - 156	± 4.1
2000	13	93.3	77 - 110	± 5.4
2001	4	83.8	78 - 95	±12.8
East Fork,				
1994	112	153.1	77 - 191	± 4.1
1995	47	139.9	73 - 184	± 9.4
1996	18	121.4	88 - 172	±13.3

Table 10. Continued.

Age, location, year	N	Fork length (mm) Mean	Range	95% C.I.
Age 1,				
East Fork, (cont.)				
1997	210	102.5	67 - 176	± 2.4
1998	236	91.1	64 - 155	± 2.0
1999	38	100.4	69 - 139	± 5.3
2000	77	109.9	81 - 168	± 3.9
Lake Branch,				
1997	22	113.0	71 - 149	± 9.9
1998	55	110.5	67 - 154	± 5.4
1999	21	110.6	75 - 155	± 9.9
2000	9	103.6	87 - 124	± 9.8
2001	38	101.4	72 - 138	± 6.2
Green Point Creek,				
1998	225	96.9	69 - 156	± 1.5
1999	99	90.8	68 - 127	± 2.0
2000	72	92.6	70 - 123	± 2.7
2001	128	83.6	54 - 106	± 1.7
Age 2,				
Mainstem,				
1994	148	180.6	129 - 221	± 2.5
1995	134	180.3	144 - 218	± 2.7
1996	274	177.3	147 - 224	± 1.9
1997	259	178.2	134 - 243	± 2.0
1998	654	177.3	90 - 298	± 1.4
1999	504	176.0	136 - 243	± 1.4
2000	469	172.8	116 - 225	± 1.6
2001	85	173.2	116 - 225	± 4.2
West Fork,				
1994	76	176.9	128 - 232	± 4.5
1995	79	163.1	126 - 194	± 2.6
1996	50	167.5	110 - 204	± 4.9
1997	80	164.2	100 - 194	± 2.9
1998	87	173.1	117 - 255	± 4.5
1999	100	164.6	138 - 221	± 2.8
2000	67	161.4	105 - 209	± 4.0
2001	6	156.5	109 - 181	±26.2
Middle Fork,				
1995	107	173.5	103 - 249	± 3.8
1996	69	176.8	90 - 205	± 4.7
1997	167	181.4	135 - 245	± 2.3
1998	102	170.2	103 - 229	± 3.4
1999	86	165.3	112 - 194	± 3.0
2000	16	162.1	136 - 180	± 7.3
2001	31	163.1	96 - 195	±10.8
East Fork,				
1994	97	186.8	142 - 235	± 3.4
1995	78	180.5	140 - 235	± 3.6
1996	19	170.9	138 - 208	± 8.8
1997	110	178.0	136 - 266	± 3.6
1998	129	157.9	74 - 220	± 4.2

Table 10. Continued.

Age, location, year	N	Fork length (mm) Mean	Range	95% C.I.
Age 2,				
East Fork, (cont.)				
1999	159	165.8	112 - 202	± 2.2
2000	114	167.0	95 - 200	± 3.4
Lake Branch,				
1997	42	166.5	136 - 204	± 5.4
1998	58	168.0	114 - 210	± 4.8
1999	117	166.0	92 - 232	± 3.3
2000	20	161.4	112 - 202	± 9.9
2001	19	151.2	110 - 201	±11.0
Green Point Creek,				
1998	25	137.5	111 - 166	± 6.8
1999	85	133.7	89 - 165	± 3.9
2000	53	125.9	99 - 167	± 4.8
2001	61	118.5	84 - 157	± 3.2
Age 3,				
Mainstem,				
1994	23	195.0	168 - 214	± 5.1
1995	37	181.1	153 - 202	± 4.4
1996	67	180.9	149 - 246	± 4.2
1997	40	186.1	157 - 223	± 5.9
1998	60	187.8	154 - 228	± 4.3
1999	66	192.2	154 - 255	± 4.6
2000	231	183.4	150 - 241	± 2.1
2001	48	184.2	144 - 243	± 5.2
West Fork,				
1994	2	184.0	160 - 208	± 305
1995	27	185.7	162 - 240	± 8.2
1996	21	185.6	158 - 213	± 6.4
1997	8	190.2	174 - 222	±14.9
1998	43	189.5	160 - 237	± 4.8
1999	9	182.7	157 - 206	±12.7
2000	73	183.3	144 - 260	± 4.6
2001	5	175.8	162 - 191	±15.7
Middle Fork,				
1995	12	192.8	168 - 234	±11.9
1996	24	184.4	158 - 215	± 7.1
1997	6	197.8	168 - 259	±33.1
1998	5	181.0	145 - 209	±33.1
1999	13	179.5	153 - 208	±10.7
2000	12	190.8	167 - 230	± 9.5
2001	4	187.0	161 - 250	±67.2
East Fork,				
1994	8	200.8	181 - 221	±11.6
1995	7	190.7	176 - 200	± 7.2
1996	3	205.7	178 - 245	±86.9
1997	6	166.8	123 - 201	±33.7

Table 10. Continued.

Age, location, year	N	Fork length (mm) Mean	Range	95% C.I.
Age 3,				
East Fork, (cont.)				
1998	2	175.0	169 - 181	±76.2
1999	21	186.6	157 - 232	± 8.9
2000	32	192.9	157 - 246	± 7.3
Lake Branch,				
1997	11	177.4	158 - 222	±14.9
1998	18	196.3	158 - 271	±15.6
1999	22	173.0	123 - 264	±12.3
2000	23	186.5	146 - 299	±14.5
2001	12	199.5	157 - 297	±22.9
Green Point Creek,				
1998	1	218	218	--
1999	19	165.0	78 - 199	±12.1
2000	11	160.0	118 - 183	±12.2
2001	17	163.5	146 - 201	± 6.5
Age 4,				
Mainstem,				
1996	1	189	189	--
2000	1	179	179	--
2001	2	199.0	187 - 211	± 153
West Fork,				
2000	3	184.7	174 - 193	±24.1
Middle Fork,				
1998	1	237	237	--
Lake Branch,				
1999	1	276	276	--
Green Point Creek,				
1999	1	180	180	--
Total,[a]				
Mainstem,				
1994	413	176.4	67 - 221	± 2.0
1995	256	162.8	27 - 218	± 5.7
1996	606	176.6	29 - 264	± 1.7
1997	845	170.9	25 - 281	± 2.3
1998	1,338	176.7	78 - 298	± 1.2
1999	1,071	177.3	91 - 255	± 1.0
2000	1,246	175.2	80 - 255	± 1.1
2001	143	176.6	116 - 243	± 3.3
West Fork,				
1994	342	152.0	33 - 232	± 4.2
1995	153	144.3	30 - 240	± 7.7
1996	90	163.0	31 - 213	± 7.6
1997	123	163.3	47 - 222	± 3.9
1998	240	153.9	59 - 255	± 4.9
1999	143	158.9	68 - 221	± 4.3
2000	175	170.5	74 - 260	± 3.5
2001	15	161.1	68 - 360	±37.7
Middle Fork,				
1995	153	161.8	29 - 249	± 6.5

Table 10. Continued.

Age, location, year	N	Fork length (mm) Mean	Range	95% C.I.
Total,[a]				
Middle Fork, (cont.)				
1996	163	128.8	28 - 215	±10.7
1997	350	171.8	69 - 259	± 3.2
1998	202	138.4	62 - 237	± 5.8
1999	105	167.1	112 - 208	± 2.9
2000	43	149.8	77 - 230	±12.7
2001	39	157.4	78 - 250	±12.6
East Fork,				
1994	481	141.3	63 - 235	± 3.9
1995	157	155.4	28 - 238	± 7.4
1996	48	143.9	29 - 245	±14.3
1997	579	128.3	65 - 266	± 3.4
1998	528	107.0	37 - 220	± 3.2
1999	272	157.1	69 - 232	± 3.6
2000	276	151.7	75 - 246	± 4.3
Lake Branch,				
1997	86	156.2	71 - 283	± 7.3
1998	166	147.6	29 - 271	± 6.5
1999	186	161.0	75 - 276	± 4.0
2000	53	163.1	87 - 299	±10.8
2001	76	131.2	68 - 297	±10.0
Green Point Creek,				
1998	473	97.3	69 - 218	± 1.5
1999	234	115.2	65 - 199	± 3.9
2000	147	110.1	70 - 183	± 4.3
2001	385	88.6	54 - 201	± 2.5

[a] Includes juvenile migrants in which age was unknown.

Table 11. Mean weight (gm) of downstream migrant wild rainbow-steelhead sampled prior to 1 August at migrant traps located in the mainstem Hood River; the West, Middle, and East forks of the Hood River; and in Lake Branch and Green Point Creek, both of which are tributaries to the West Fork of the Hood River. (Sampling periods are in **APPENDIX A.**)

Age, location, year	N	Weight (gm) Mean	Range	95% C.I.
Age 0,				
Mainstem,				
1994	6	6.0	3.2 - 13.1	± 3.8
1995	1	4.0	4.0	--
1997	3	5.1	3.6 - 5.9	± 3.2
West Fork,				
1994	21	11.4	3.4 - 34.6	± 3.9
1998	1	3.5	3.5	--
Middle Fork,				
1995	1	2.6	2.6	--
East Fork,				
1994	63	10.0	3.2 - 24.1	± 1.1
1998	1	3.4	3.4	--
Age 1,				
Mainstem,				
1994	43	44.3	21.1 - 69.8	± 3.2
1995	43	54.1	4.6 - 89.1	± 5.6
1996	31	48.6	7.2 - 85.4	± 6.4
1997	56	41.7	5.2 - 82.2	± 5.8
1998	59	33.4	5.0 - 72.6	± 5.1
1999	4	29.9	11.5 - 75.0	±48.4
2000	30	36.9	7.5 - 70.3	± 5.6
2001	3	28.0	22.3 - 33.0	±13.4
West Fork,				
1994	62	44.8	21.1 - 68.6	± 2.4
1995	16	15.1	4.5 - 44.9	± 6.4
1996	7	18.1	4.3 - 73.1	±22.5
1997	4	15.2	5.9 - 36.9	±23.2
1998	80	15.8	3.8 - 46.4	± 2.1
1999	12	8.4	2.4 - 17.2	± 2.9
2000	4	19.4	5.9 - 53.0	±35.7
2001	2	6.8	6.6 - 6.9	± 1.9
Middle Fork,				
1995	23	32.3	5.3 - 94.9	±11.6
1996	13	21.3	7.2 - 49.8	± 7.8
1997	36	16.4	3.8 - 44.8	± 3.2
1998	78	11.0	2.3 - 39.7	± 1.4
2000	13	9.0	4.5 - 16.4	± 1.8
2001	4	5.9	4.5 - 7.6	± 2.4
East Fork,				
1994	101	39.0	8.7 - 66.1	± 2.6
1995	42	33.6	4.2 - 60.4	± 4.9
1996	16	20.7	7.8 - 50.5	± 7.0

Table 11. Continued.

Age, location, year	N	Weight (gm) Mean	Range	95% C.I.
Age 1,				
East Fork, (cont.)				
1997	204	14.0	3.3 - 54.2	± 1.1
1998	231	8.9	2.8 - 36.0	± 0.7
1999	38	12.5	3.6 - 30.5	± 2.1
2000	77	16.3	5.9 - 51.3	± 1.8
Lake Branch,				
1997	22	18.4	4.1 - 37.8	± 4.6
1998	53	16.1	3.2 - 34.5	± 2.3
1999	21	16.6	2.5 - 43.8	± 5.1
2000	9	12.9	7.0 - 20.5	± 3.6
2001	38	12.2	4.1 - 28.5	± 2.2
Age 2,				
Mainstem,				
1994	109	60.7	26.1 - 91.8	± 2.7
1995	132	58.2	27.3 -117.6	± 2.9
1996	242	53.7	26.3 -115.2	± 1.9
1997	258	57.6	24.2 -144.2	± 2.0
1998	654	55.5	6.9 -269.7	± 1.3
1999	504	55.3	24.3 -149.0	± 1.4
2000	466	51.3	15.7 -115.5	± 1.4
2001	84	53.3	16.7 -119.9	± 3.7
West Fork,				
1994	66	57.9	21.3 -133.8	± 4.5
1995	78	42.8	18.6 - 75.5	± 2.1
1996	47	46.6	13.3 - 79.9	± 4.2
1997	80	46.3	11.6 - 76.2	± 2.3
1998	82	53.2	20.4 -146.6	± 3.9
1999	99	44.9	26.7 -120.6	± 2.6
2000	67	42.0	12.4 - 84.5	± 2.8
2001	6	39.7	12.1 - 53.9	±16.0
Middle Fork,				
1995	107	54.3	10.5 -151.8	± 4.0
1996	63	54.6	7.9 - 84.1	± 3.8
1997	167	63.4	28.5 -157.8	± 2.5
1998	96	52.6	12.4 -110.3	± 2.9
1999	86	46.4	13.8 - 76.8	± 2.4
2000	16	44.3	25.1 - 59.8	± 6.1
2001	30	47.6	7.9 - 78.7	± 7.6
East Fork,				
1994	88	65.6	31.2 -151.0	± 4.0
1995	69	59.1	33.8 -129.0	± 4.0
1996	17	43.9	23.5 - 78.4	± 7.3
1997	110	58.0	27.8 -196.0	± 4.2
1998	129	42.1	4.6 - 79.0	± 2.7
1999	155	47.2	17.1 - 82.3	± 1.7
2000	113	46.9	8.6 - 77.9	± 2.4
Lake Branch,				
1997	42	47.1	24.6 -102.7	± 5.3
1998	54	48.2	16.0 - 91.7	± 4.3

Table 11. Continued.

Age, location, year	N	Weight (gm) Mean	Range	95% C.I.
Age 2,				
Lake Branch, (cont.)				
1999	117	45.9	6.8 -119.0	± 3.1
2000	19	43.7	13.3 - 85.8	± 8.4
2001	19	38.6	13.0 - 83.7	± 8.4
Age 3,				
Mainstem,				
1994	17	75.3	46.7 -100.9	± 7.9
1995	35	56.7	29.6 - 82.7	± 5.0
1996	59	55.2	28.8 -116.2	± 4.0
1997	38	64.3	38.2 -106.6	± 6.0
1998	59	63.3	32.3 -115.0	± 4.5
1999	66	68.8	35.4 -187.7	± 5.8
2000	231	59.3	31.8 -131.4	± 2.3
2001	47	61.4	31.5 -153.1	± 6.0
West Fork,				
1994	2	65.8	43.2 - 88.3	± 287
1995	27	64.5	37.6 -135.4	± 9.6
1996	19	63.6	46.3 - 93.4	± 6.3
1997	8	64.2	45.2 - 99.6	±18.3
1998	38	66.8	38.3 -125.3	± 5.2
1999	8	56.8	34.2 - 83.3	±13.3
2000	73	59.6	27.7 -174.8	± 5.1
2001	5	52.0	45.9 - 59.6	± 8.4
Middle Fork,				
1995	11	71.9	54.0 -128.6	±16.1
1996	24	62.1	38.4 - 94.9	± 7.0
1997	6	75.4	47.6 -167.8	±48.4
1998	5	64.4	24.6 - 98.4	±39.0
1999	13	56.8	34.8 - 78.8	± 9.1
2000	12	68.5	40.1 -114.5	±11.3
2001	4	67.0	33.8 -131.3	±70.1
East Fork,				
1994	7	81.6	60.1 -112.0	±14.8
1995	7	67.0	50.0 - 87.0	±10.3
1996	2	66.5	48.9 - 84.1	± 224
1997	6	51.0	18.6 - 88.9	±28.7
1998	2	52.4	44.9 - 59.9	±95.3
1999	21	67.2	37.4 -161.1	±12.5
2000	32	70.0	36.9 -157.1	± 8.7
Lake Branch,				
1997	11	59.1	37.5 -132.3	±20.1
1998	17	79.9	39.1 -217.9	±24.5
1999	21	55.9	27.0 -216.6	±18.0
2000	23	68.9	29.0 -294.3	±24.3
2001	12	86.3	34.5 -247.0	±35.6

Table 11. Continued.

Age, location, year	N	Weight (gm) Mean	Range	95% C.I.
Age 4,				
Mainstem,				
1996	1	60.0	60.0	--
2000	1	51.5	51.5	--
2001	2	71.9	58.2 - 85.6	± 174
West Fork,				
2000	3	64.9	61.1 - 71.8	±14.9
Middle Fork,				
1998	1	135.9	135.9	--
Lake Branch,				
1999	1	229.0	229.0	--
Total,[a]				
Mainstem,				
1994	276	56.3	3.2 -100.9	± 2.1
1995	239	51.7	0.1 -117.6	± 2.9
1996	526	53.9	0.9 -126.4	± 1.4
1997	686	55.6	3.6 -236.7	± 1.5
1998	1,323	55.6	5.0 -269.7	± 1.0
1999	1,069	56.2	7.7 -187.7	± 1.0
2000	1,237	53.0	5.3 -165.3	± 1.0
2001	141	55.8	16.7 -153.1	± 3.1
West Fork,				
1994	258	40.4	2.2 -133.8	± 2.8
1995	145	39.3	0.2 -135.4	± 3.7
1996	81	48.8	4.3 - 93.4	± 4.1
1997	123	45.8	1.2 - 99.6	± 2.5
1998	226	41.8	3.5 -146.6	± 3.3
1999	141	41.8	2.4 -120.6	± 2.7
2000	175	49.8	4.3 -174.8	± 2.9
2001	15	69.7	2.1 -531.3	±71.6
Middle Fork,				
1995	150	49.5	0.3 -151.8	± 4.2
1996	107	52.4	7.2 - 94.9	± 3.6
1997	349	57.2	3.8 -167.8	± 2.4
1998	192	35.1	2.3 -135.9	± 3.6
1999	105	47.7	13.8 - 78.8	± 2.3
2000	43	40.5	4.5 -114.5	± 8.0
2001	38	45.2	4.5 -131.3	± 8.7
East Fork,				
1994	365	37.3	3.2 -151.0	± 2.8
1995	128	50.0	4.2 -129.0	± 3.5
1996	39	37.6	7.8 - 84.1	± 6.8
1997	552	29.4	3.0 -196.0	± 2.1
1998	520	17.6	0.4 - 79.0	± 1.5
1999	268	43.2	3.6 -161.1	± 2.3
2000	275	39.9	4.4 -157.1	± 2.7
Lake Branch,				
1997	86	43.2	4.1 -196.1	± 5.9
1998	152	40.2	3.2 -217.9	± 4.6

Table 11. Continued.

Age, location, year	N	Weight (gm) Mean	Range	95% C.I.
Total,[a] Lake Branch, (cont.)				
1999	185	44.1	2.5 -229.0	± 3.7
2000	52	49.8	7.0 -294.3	±12.1
2001	76	31.5	3.8 -247.0	± 8.1

[a] Includes juvenile migrants in which age was unknown.

Table 12. Condition factor of downstream migrant wild rainbow-steelhead sampled prior to 1 August at migrant traps located in the mainstem Hood River; the West, Middle, and East forks of the Hood River; and in Lake Branch and Green Point Creek, both of which are tributaries to the West Fork of the Hood River. (Sampling periods are in **APPENDIX A.**)

Age, location, year	N	Condition factor[a] Mean	Range	95% C.I.
Age 0,				
Mainstem,				
1994	6	1.17	1.06 - 1.42	±0.14
1995	1	1.07	1.07	--
1997	3	1.31	1.10 - 1.55	±0.57
West Fork,				
1994	21	1.10	0.90 - 1.38	±0.05
1998	1	1.07	1.07	--
Middle Fork,				
1995	1	1.09	1.09	--
East Fork,				
1994	63	1.09	0.86 - 1.64	±0.04
1998	1	1.08	1.08	--
Age 1,				
Mainstem,				
1994	43	0.96	0.75 - 1.22	±0.03
1995	43	1.07	0.86 - 1.30	±0.04
1996	31	1.01	0.84 - 1.22	±0.04
1997	56	1.05	0.88 - 1.24	±0.02
1998	59	1.04	0.84 - 1.35	±0.03
1999	4	1.14	1.03 - 1.22	±0.13
2000	30	1.07	0.86 - 2.06	±0.08
2001	3	1.05	0.96 - 1.11	±0.20
West Fork,				
1994	62	0.95	0.74 - 1.08	±0.02
1995	16	1.03	0.88 - 1.20	±0.05
1996	7	1.17	0.98 - 1.26	±0.09
1997	4	1.14	1.12 - 1.15	±0.03
1998	80	1.06	0.87 - 1.33	±0.02
1999	12	1.08	0.67 - 1.33	±0.11
2000	4	1.06	0.91 - 1.19	±0.19
2001	2	1.10	1.01 - 1.20	±1.17
Middle Fork,				
1995	23	1.07	0.84 - 1.20	±0.05
1996	13	1.15	1.04 - 1.26	±0.04
1997	36	1.20	0.92 - 1.32	±0.03
1998	78	1.10	0.86 - 1.64	±0.03
2000	13	1.07	0.98 - 1.23	±0.05
2001	4	1.00	0.89 - 1.15	±0.18
East Fork,				
1994	101	1.04	0.85 - 1.28	±0.02
1995	42	1.02	0.82 - 1.25	±0.03
1996	16	1.06	0.92 - 1.20	±0.04

Table 12. Continued.

Age, location, year	N	Condition factor[a] Mean	Range	95% C.I.
Age 1,				
East Fork, (cont.)				
1997	204	1.17	0.70 - 1.73	±0.02
1998	231	1.08	0.52 - 1.39	±0.01
1999	38	1.14	0.76 - 1.87	±0.06
2000	77	1.15	1.02 - 1.63	±0.02
Lake Branch,				
1997	22	1.12	0.96 - 1.28	±0.04
1998	53	1.07	0.91 - 1.33	±0.02
1999	21	1.05	0.59 - 1.33	±0.09
2000	9	1.12	1.02 - 1.23	±0.06
2001	38	1.06	0.85 - 1.41	±0.03
Age 2,				
Mainstem,				
1994	109	1.02	0.83 - 1.46	±0.02
1995	132	0.97	0.78 - 1.24	±0.01
1996	242	0.94	0.70 - 1.12	±0.01
1997	258	1.00	0.81 - 1.36	±0.01
1998	654	0.97	0.50 - 1.36	±0.01
1999	504	0.99	0.58 - 1.62	±0.01
2000	466	0.97	0.80 - 1.48	±0.01
2001	84	0.99	0.87 - 1.32	±0.02
West Fork,				
1994	66	0.99	0.84 - 1.39	±0.02
1995	78	0.97	0.73 - 1.17	±0.02
1996	47	0.98	0.82 - 1.09	±0.02
1997	80	1.03	0.85 - 1.26	±0.02
1998	82	0.98	0.78 - 1.24	±0.02
1999	99	0.99	0.82 - 1.23	±0.01
2000	67	0.98	0.87 - 1.24	±0.02
2001	6	0.98	0.85 - 1.10	±0.10
Middle Fork,				
1995	107	1.00	0.64 - 1.75	±0.02
1996	63	0.98	0.81 - 1.15	±0.02
1997	167	1.04	0.81 - 1.36	±0.01
1998	96	1.03	0.90 - 1.25	±0.01
1999	86	1.01	0.83 - 1.34	±0.02
2000	16	1.02	0.91 - 1.18	±0.04
2001	30	1.02	0.89 - 1.22	±0.03
East Fork,				
1994	88	0.98	0.77 - 1.16	±0.02
1995	69	0.99	0.87 - 1.29	±0.02
1996	17	0.88	0.60 - 1.01	±0.05
1997	110	0.99	0.52 - 1.18	±0.02
1998	129	1.02	0.57 - 1.20	±0.02
1999	155	1.01	0.82 - 1.28	±0.01
2000	113	0.98	0.81 - 1.33	±0.02
Lake Branch,				
1997	42	0.98	0.84 - 1.50	±0.04
1998	54	0.98	0.70 - 1.21	±0.02

Table 12. Continued.

Age, location, year	N	Condition factor[a] Mean	Range	95% C.I.
Age 2,				
Lake Branch, (cont.)				
1999	117	0.97	0.81 - 1.29	±0.02
2000	19	1.00	0.87 - 1.27	±0.04
2001	19	1.06	0.86 - 1.24	±0.05
Age 3,				
Mainstem,				
1994	17	1.01	0.82 - 1.27	±0.06
1995	35	0.93	0.81 - 1.17	±0.03
1996	59	0.92	0.73 - 1.13	±0.02
1997	38	0.97	0.73 - 1.25	±0.03
1998	59	0.94	0.78 - 1.15	±0.02
1999	66	0.94	0.77 - 1.13	±0.02
2000	231	0.94	0.74 - 1.15	±0.01
2001	47	0.96	0.73 - 1.39	±0.03
West Fork,				
1994	2	1.02	0.98 - 1.05	±0.47
1995	27	0.97	0.84 - 1.10	±0.03
1996	19	0.96	0.80 - 1.10	±0.04
1997	8	0.90	0.81 - 1.05	±0.07
1998	38	0.95	0.70 - 1.06	±0.02
1999	8	0.93	0.84 - 1.09	±0.06
2000	73	0.94	0.82 - 1.12	±0.01
2001	5	0.96	0.86 - 1.09	±0.12
Middle Fork,				
1995	11	0.94	0.88 - 1.02	±0.03
1996	24	0.97	0.83 - 1.10	±0.03
1997	6	0.91	0.68 - 1.02	±0.14
1998	5	1.00	0.81 - 1.08	±0.14
1999	13	0.96	0.88 - 1.09	±0.03
2000	12	0.97	0.83 - 1.15	±0.06
2001	4	0.95	0.75 - 1.16	±0.30
East Fork,				
1994	7	0.96	0.90 - 1.04	±0.04
1995	7	0.96	0.90 - 1.09	±0.06
1996	2	1.01	0.87 - 1.15	±1.81
1997	6	1.01	0.86 - 1.19	±0.13
1998	2	0.97	0.93 - 1.01	±0.51
1999	21	0.99	0.89 - 1.29	±0.04
2000	32	0.95	0.82 - 1.09	±0.03
Lake Branch,				
1997	11	0.99	0.85 - 1.31	±0.10
1998	17	0.96	0.83 - 1.19	±0.04
1999	21	0.95	0.81 - 1.18	±0.04
2000	23	0.93	0.76 - 1.10	±0.04
2001	12	0.99	0.85 - 1.14	±0.06

Table 12. Continued.

Age, location, year	N	Condition factor[a] Mean	Range	95% C.I.
Age 4,				
Mainstem,				
1996	1	0.89	0.89	--
2000	1	0.90	0.90	--
2001	2	0.90	0.89 - 0.91	±0.14
West Fork,				
2000	3	1.05	0.85 - 1.36	±0.68
Middle Fork,				
1998	1	1.02	1.02	--
Lake Branch,				
1999	1	1.09	1.09	--
Total,[b]				
Mainstem,				
1994	276	1.01	0.75 - 1.46	±0.01
1995	239	0.98	0.34 - 1.65	±0.02
1996	526	0.94	0.69 - 1.31	±0.01
1997	686	1.00	0.72 - 1.55	±0.01
1998	1,323	0.97	0.50 - 1.37	±0.004
1999	1,068	0.99	0.58 - 1.62	±0.01
2000	1,237	0.96	0.69 - 2.06	±0.005
2001	141	0.98	0.73 - 1.39	±0.02
West Fork,				
1994	258	0.99	0.52 - 1.39	±0.01
1995	145	0.97	0.67 - 1.20	±0.02
1996	81	0.99	0.80 - 1.26	±0.02
1997	123	1.01	0.67 - 1.26	±0.02
1998	226	1.00	0.70 - 1.33	±0.01
1999	141	0.99	0.67 - 1.33	±0.01
2000	175	0.96	0.82 - 1.36	±0.01
2001	15	0.98	0.67 - 1.20	±0.07
Middle Fork,				
1995	150	1.01	0.64 - 1.75	±0.02
1996	107	1.00	0.81 - 1.26	±0.02
1997	349	1.06	0.68 - 1.39	±0.01
1998	192	1.06	0.81 - 1.64	±0.01
1999	105	1.00	0.83 - 1.34	±0.01
2000	43	1.02	0.83 - 1.23	±0.03
2001	38	1.01	0.75 - 1.22	±0.03
East Fork,				
1994	365	1.03	0.70 - 1.64	±0.01
1995	128	1.00	0.82 - 1.29	±0.01
1996	39	0.97	0.60 - 1.20	±0.04
1997	552	1.09	0.52 - 1.73	±0.01
1998	520	1.06	0.52 - 1.46	±0.01
1999	268	1.03	0.76 - 1.87	±0.01
2000	275	1.02	0.81 - 1.63	±0.01
Lake Branch,				
1997	86	1.01	0.84 - 1.50	±0.03
1998	152	1.01	0.70 - 1.33	±0.02

Table 12. Continued.

Age, location, year	N	Condition factor[a] Mean	Range	95% C.I.
Total,[b] Lake Branch, (cont.)				
1999	185	0.97	0.59 - 1.33	±0.02
2000	52	0.99	0.76 - 1.27	±0.03
2001	76	1.05	0.85 - 1.41	±0.02

[a] Condition factor was estimated as (100*weight(gm)/length(cm)^3).
[b] Includes juvenile migrants in which age was unknown.

Table 13. Mean fork length (mm) of downstream migrant wild rainbow-steelhead sampled prior to 1 August at migrant traps located in the Hood River subbasin, by brood year and freshwater age category. (Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables.)

Location, brood year	Freshwater age				
	Age 0	Age 1	Age 2	Age 3	Age 4
Mainstem,					
1991	--	--	--	195.0 (23)	--
1992	--	--	180.6 (148)	181.1 (37)	189 (1)
1993	--	166.0 (55)	180.3 (134)	180.9 (67)	--
1994	78.3 (6)	168.7 (45)	177.3 (274)	186.1 (40)	--
1995	72 (1)	169.0 (34)	178.2 (259)	187.8 (60)	--
1996	--	151.8 (56)	177.3 (654)	192.2 (66)	179 (1)
1997	72.7 (3)	140.2 (60)	176.0 (504)	183.4 (231)	199.0 (2)
1998	--	128.2 (4)	172.8 (469)	184.2 (48)	--
1999	--	149.1 (30)	173.2 (85)	--	--
2000	--	138.3 (3)	--	--	--
West Fork,					
1991	--	--	--	184.0 (2)	--
1992	--	--	176.9 (76)	185.7 (27)	--
1993	--	166.0 (83)	163.1 (79)	185.6 (21)	--
1994	97.0 (24)	107.8 (16)	167.5 (50)	190.2 (8)	--
1995	--	104.0 (7)	164.2 (80)	189.5 (43)	--
1996	--	103.5 (4)	173.1 (87)	182.7 (9)	184.7 (3)
1997	--	110.7 (80)	164.6 (100)	183.3 (73)	--
1998	69 (1)	88.9 (12)	161.4 (67)	175.8 (5)	--
1999	--	112.5 (4)	156.5 (6)	--	--
2000	--	85.0 (2)	--	--	--
Middle Fork,					
1992	--	--	--	192.8 (12)	--
1993	--	--	173.5 (107)	184.4 (24)	--
1994	--	135.2 (24)	176.8 (69)	197.8 (6)	237 (1)
1995	62 (1)	118.6 (13)	181.4 (167)	181.0 (5)	--
1996	--	107.2 (36)	170.2 (102)	179.5 (13)	--
1997	--	96.6 (82)	165.3 (86)	190.8 (12)	--
1998	--	--	162.1 (16)	187.0 (4)	--
1999	--	93.3 (13)	163.1 (31)	--	--
2000	--	83.8 (4)	--	--	--
East Fork,					
1991	--	--	--	200.8 (8)	--
1992	--	--	186.8 (97)	190.7 (7)	--
1993	--	153.1 (112)	180.5 (78)	205.7 (3)	--
1994	96.9 (72)	139.9 (47)	170.9 (19)	166.8 (6)	--
1995	--	121.4 (18)	178.0 (110)	175.0 (2)	--
1996	--	102.5 (210)	157.9 (129)	186.6 (21)	--
1997	--	91.1 (236)	165.8 (159)	192.9 (32)	--
1998	70.0 (2)	100.4 (38)	167.0 (114)	--	--
1999	--	109.9 (77)	--	--	--

Table 13. Continued.

Location, brood year	Freshwater age				
	Age 0	Age 1	Age 2	Age 3	Age 4
Lake Branch,					
1994	--	--	--	177.4 (11)	--
1995	--	--	166.5 (42)	196.3 (18)	276 (1)
1996	--	113.0 (22)	168.0 (58)	173.0 (22)	--
1997	--	110.5 (55)	166.0 (117)	186.5 (23)	--
1998	--	110.6 (21)	161.4 (20)	199.5 (12)	--
1999	--	103.6 (9)	151.2 (19)	--	--
2000	--	101.4 (38)	--	--	--
Green Point Creek,					
1995	--	--	--	218 (1)	180 (1)
1996	--	--	137.5 (25)	165.0 (19)	--
1997	--	96.9 (225)	133.7 (85)	160.0 (11)	--
1998	--	90.8 (99)	125.9 (53)	163.5 (17)	--
1999	--	92.6 (72)	118.5 (61)	--	--
2000	79 (1)	83.6 (128)	--	--	--

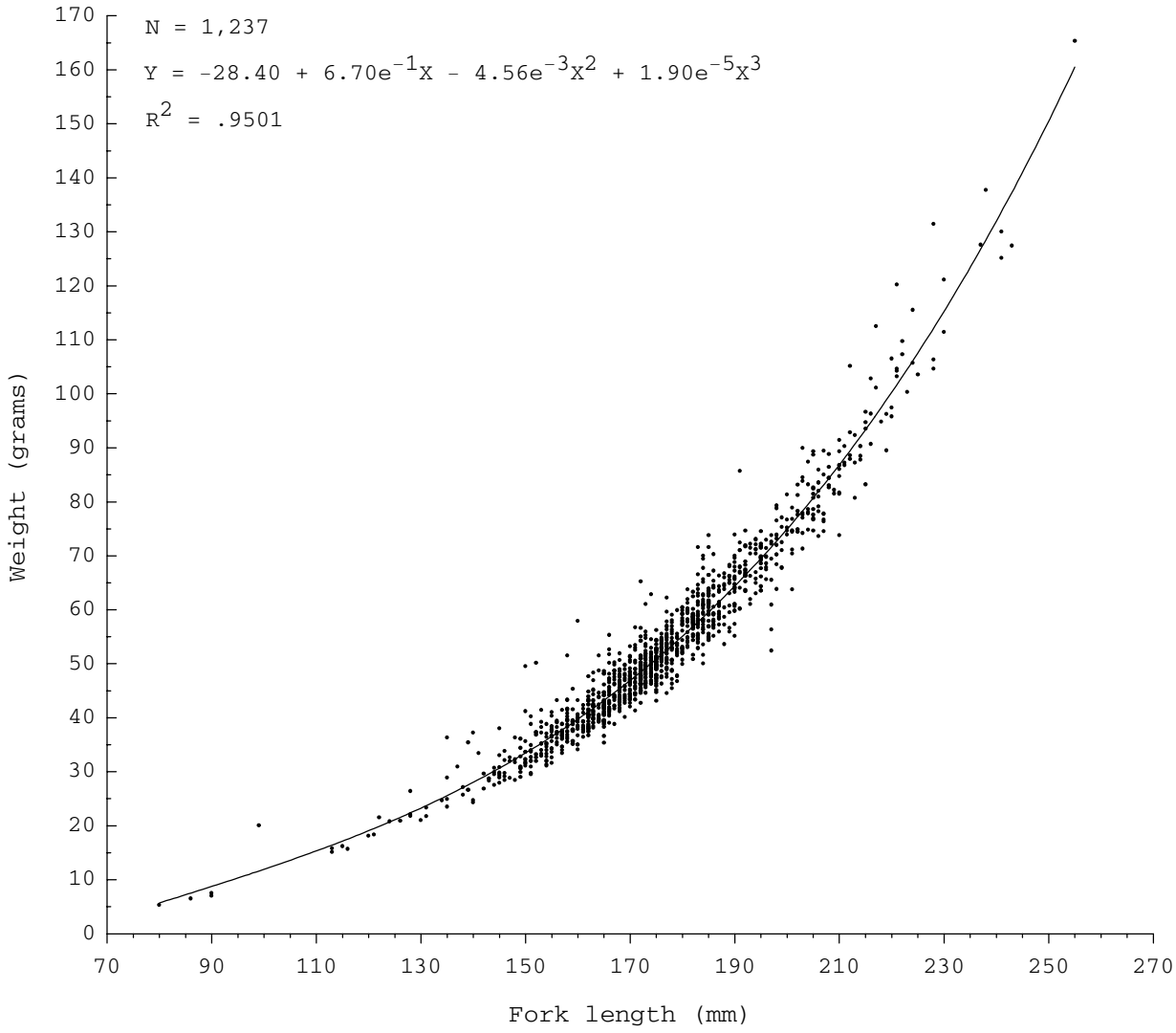

Figure 4. Length x weight regression of downstream migrant wild rainbow-steelhead sampled from 5 April through 31 July 2000 at a juvenile migrant trap located at RM 4.5 in the mainstem Hood River.

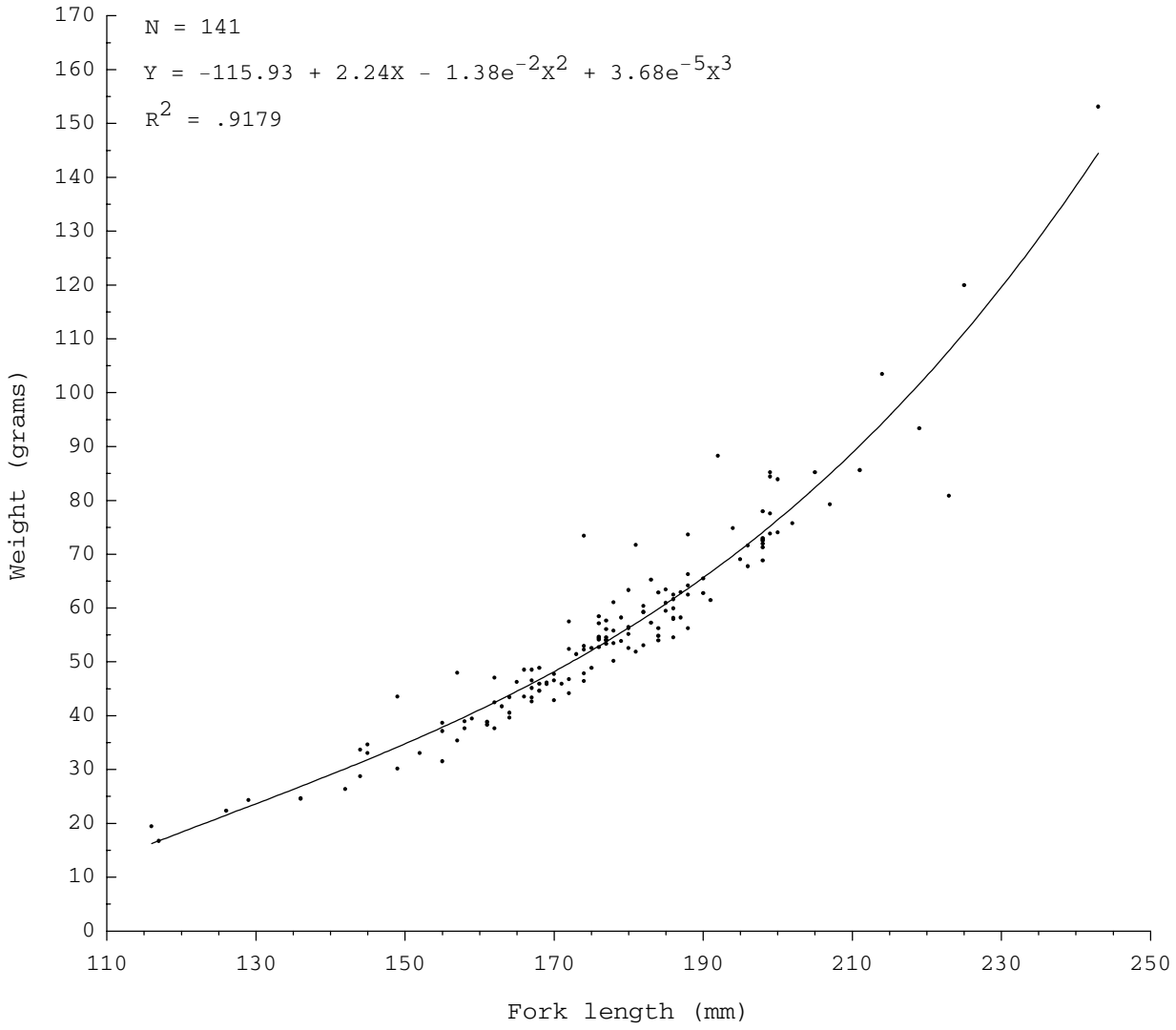

Figure 5. Length x weight regression of downstream migrant wild rainbow-steelhead sampled from 11 April through 31 July 2001 at a juvenile migrant trap located at RM 4.5 in the mainstem Hood River.

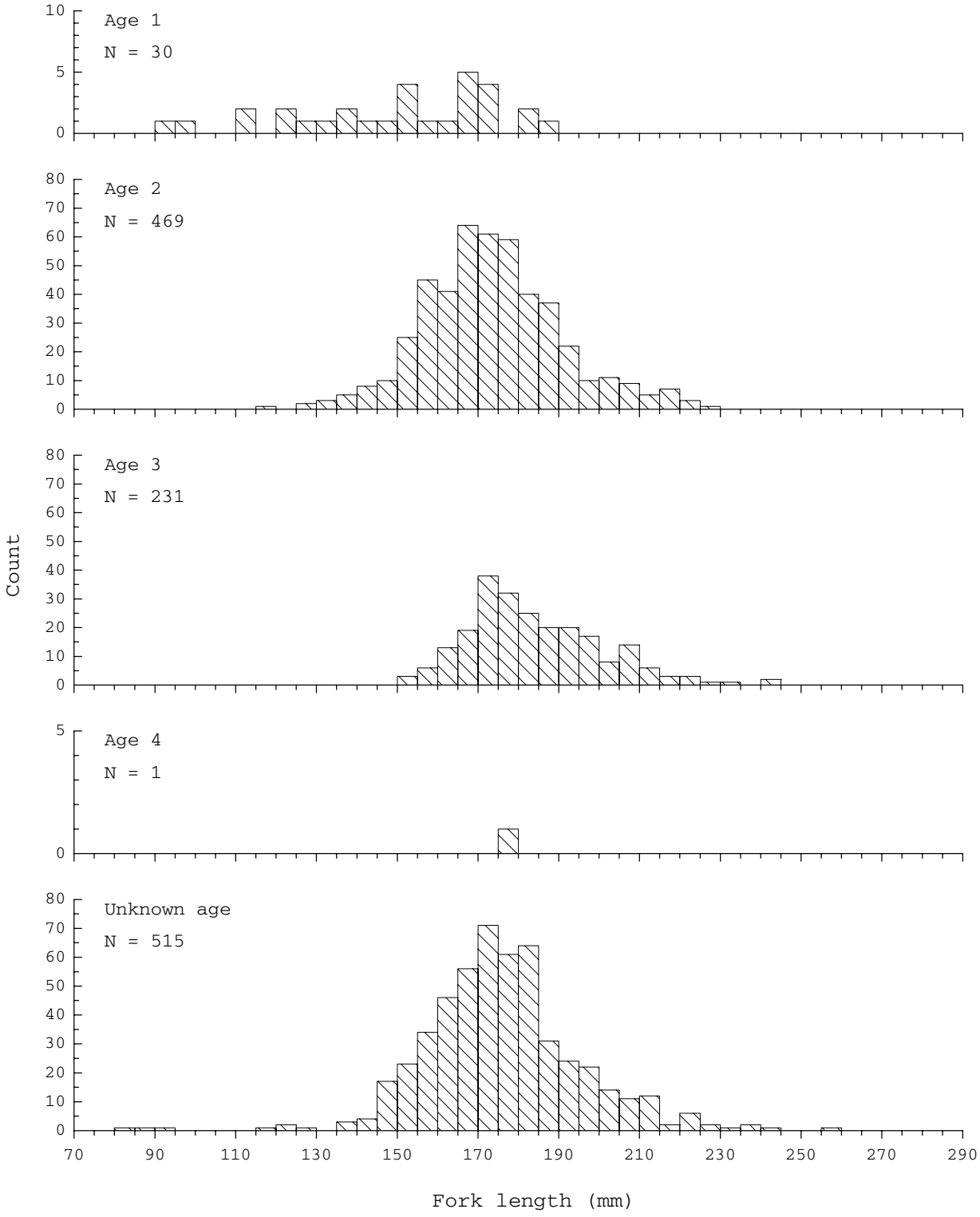

Figure 6. Length frequency histogram of downstream migrant wild rainbow-steelhead sampled from 5 April through 31 July 2000 at a juvenile migrant trap located at RM 4.5 in the mainstem Hood River, by age category.

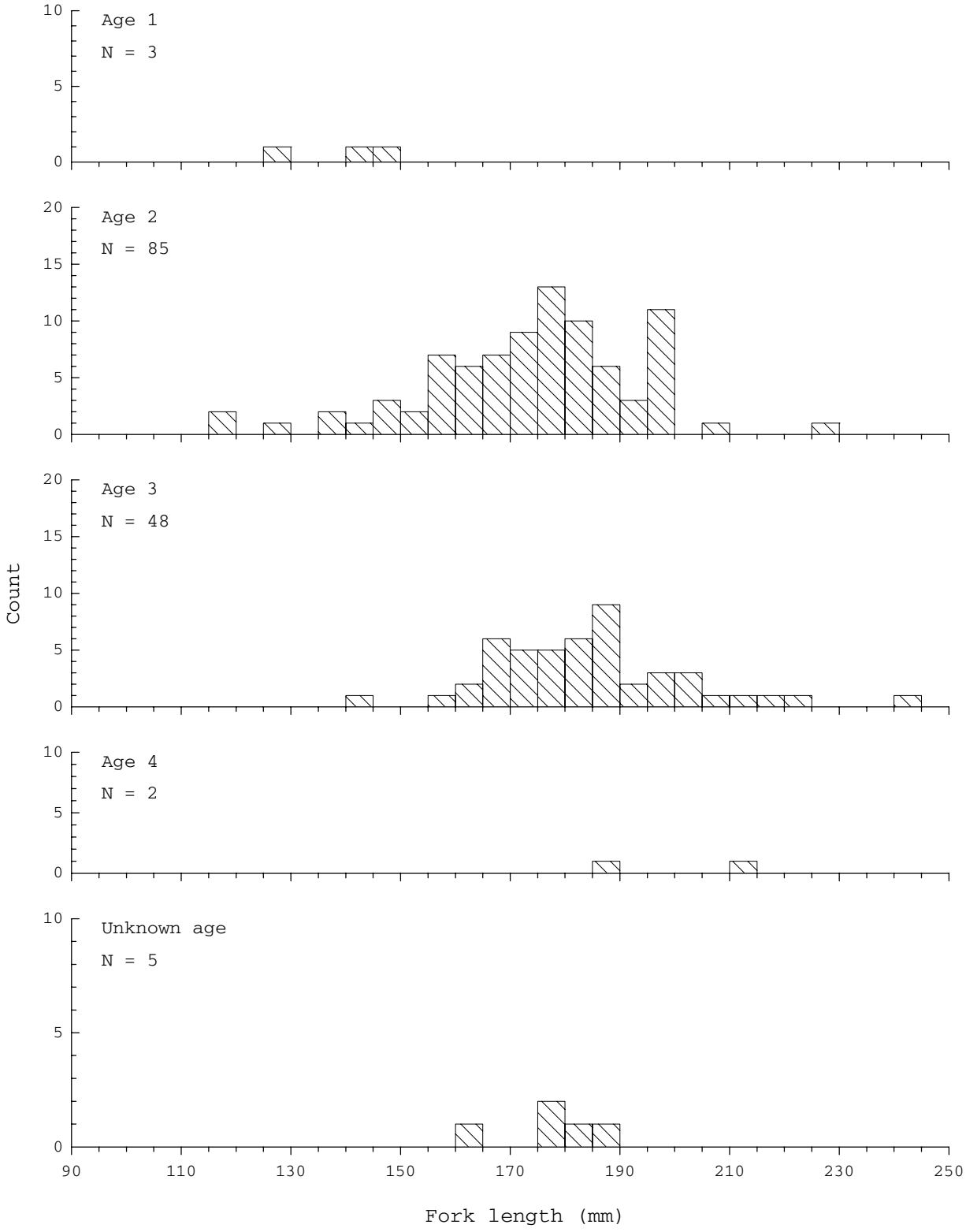

Figure 7. Length frequency histogram of downstream migrant wild rainbow-steelhead sampled from 11 April through 31 July 2001 at a juvenile migrant trap located at RM 4.5 in the mainstem Hood River, by age category.

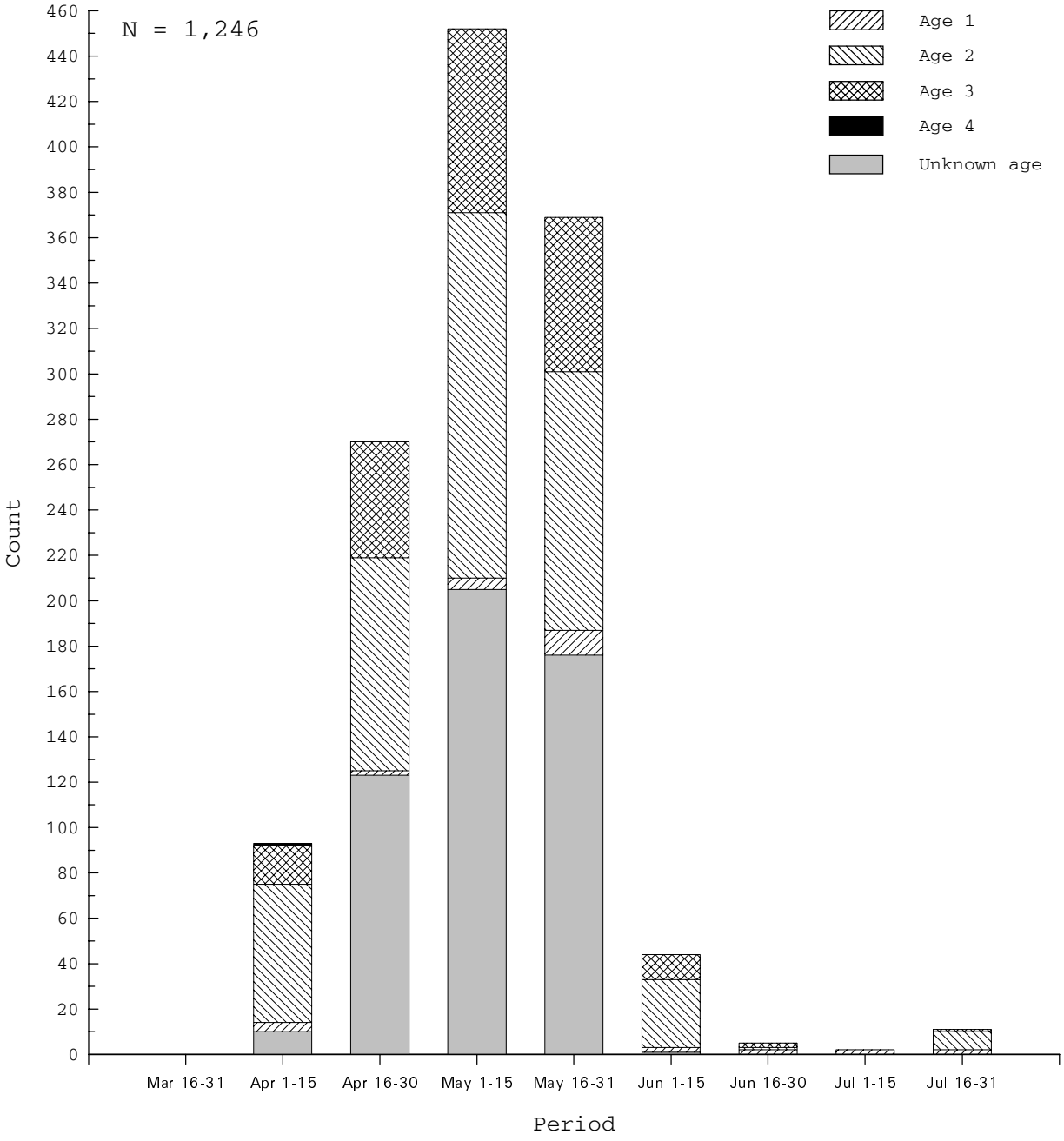

Figure 8. Temporal distribution of downstream migrant wild rainbow-steelhead sampled from 5 April through 31 July 2000 at a juvenile migrant trap located at RM 4.5 in the mainstem Hood River. Estimates are not adjusted for trap efficiency.

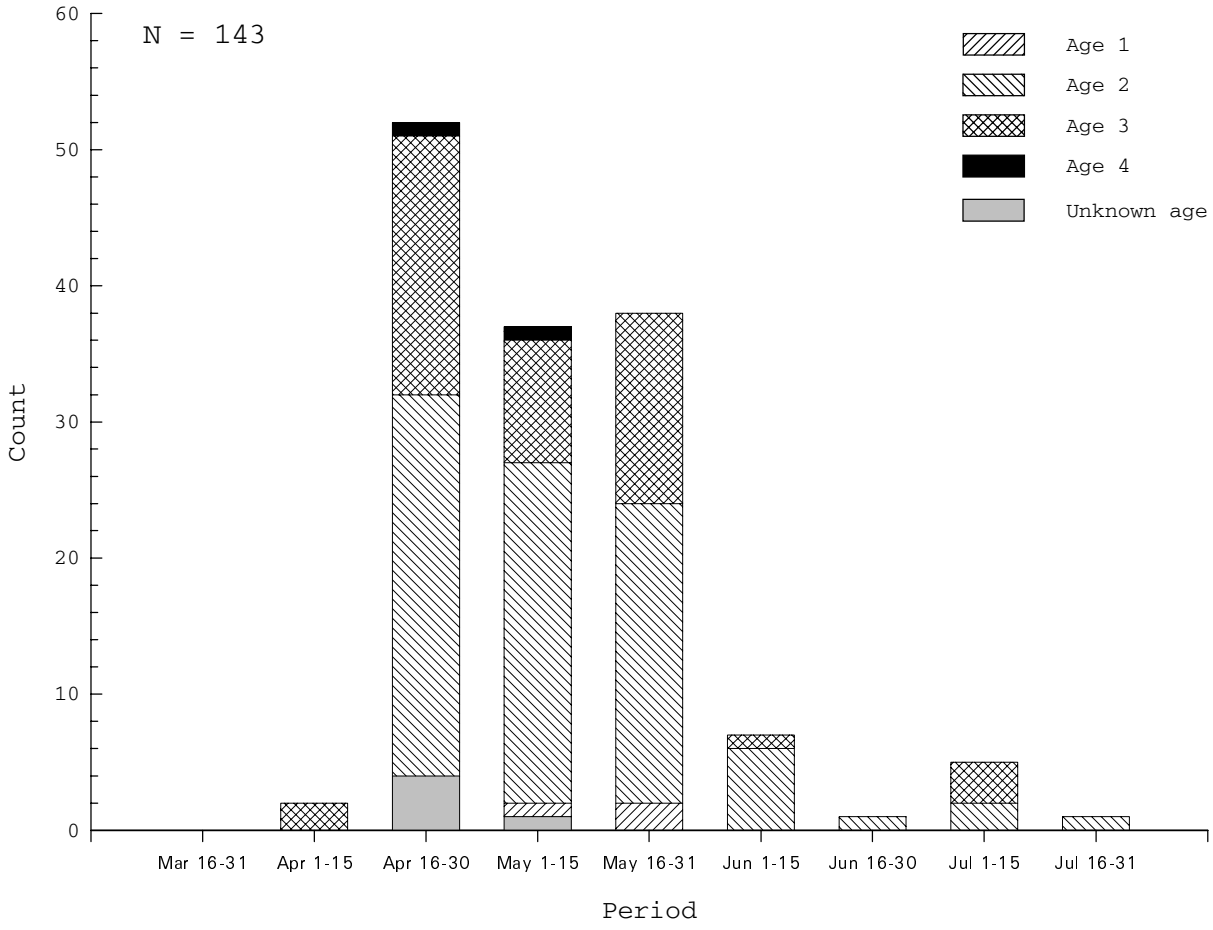

Figure 9. Temporal distribution of downstream migrant wild rainbow-steelhead sampled from 11 April through 31 July 2001 at a juvenile migrant trap located at RM 4.5 in the mainstem Hood River. Estimates are not adjusted for trap efficiency.

Table 14. Run year specific estimates of wild cutthroat trout escapements to an adult migrant trap operated at Powerdale Dam. Escapements are summarized by bi-weekly time period.

	Total	February		March		April		May		June		July		August	
Run year	escapement	01-15	16-29	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-31
1992	4	--	1	3	--	0	0	--	--	--	--	--	0	0	--
1993	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1994	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1995	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1996	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1997	3	--	0	0	--	0	0	--	--	--	--	--	1	2	--
1998	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1999	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2000	1	--	0	0	1	0	0	--	--	--	--	--	0	0	--
2001	11	--	0	3	3	2	3	--	--	--	--	--	0	0	--

Table 15. Counts of cutthroat trout at downstream migrant traps located in the mainstem Hood River; in the West, Middle, and East forks of the Hood River; and in Lake Branch, a tributary to the West Fork of the Hood River. Estimates are summarized by year of capture. (Sampling periods are the same as for wild rainbow-steelhead [*see* **APPENDIX A**].)

Year	mainstem	West fork	Middle fork	East fork	Lake Branch
1994	2	1	--	14	--
1995	6	0	1	6	--
1996	14	1	4	6	--
1997	14	0	1	3	0
1998	18	0	5	20	0
1999	14	0	3	13	0
2000	13	0	6	11	0
2001	3	0	2	--	1

Table 16. Estimates of mean fork length (FL (mm)), weight (gm), and condition factor (CF) for wild downstream migrant cutthroat trout sampled at juvenile migrant traps located in the Hood River subbasin. (Sampling periods are the same as for wild rainbow-steelhead [*see* **APPENDIX A**].)

Statistic, year	N	Mean	Range	95% C.I.
FL (mm),				
1994	15	175.1	142 - 202	± 9.7
1995	11	171.5	148 - 204	± 10.2
1996	24	170.1	97 - 215	± 10.2
1997	16	186.3	159 - 273	± 14.9
1998	43	170.7	124 - 233	± 6.4
1999	28	177.4	125 - 305	± 11.7
2000	49	170.4	102 - 244	± 7.1
2001	5	150.2	130 - 172	± 22.8

Table 16. Continued.

Statistic, year	N	Mean	Range	95% C.I.
Weight (gm),				
1994	12	55.8	29.0 - 89.0	± 12.4
1995	10	50.1	29.6 - 82.3	± 10.6
1996	22	49.0	8.5 - 81.9	± 7.8
1997	16	64.9	40.9 -172.3	± 17.4
1998	43	48.3	19.0 -113.7	± 5.4
1999	28	56.8	20.4 -243.2	± 15.3
2000	48	50.4	12.0 -133.2	± 6.5
2001	5	34.9	24.9 - 51.8	± 13.9
CF,[a]				
1994	12	1.00	0.89 - 1.12	± 0.05
1995	10	0.95	0.86 - 1.03	± 0.05
1996	22	0.93	0.81 - 1.16	± 0.04
1997	16	0.95	0.85 - 1.11	± 0.04
1998	43	0.94	0.62 - 1.64	± 0.04
1999	28	0.94	0.84 - 1.04	± 0.02
2000	48	0.97	0.79 - 1.13	± 0.02
2001	5	1.01	0.87 - 1.13	± 0.12

[a] Condition factor was estimated as (100*weight(gm)/length(cm)^3).

Table 17. Run year specific estimates of wild bull trout escapements to an adult migrant trap operated at Powerdale Dam. Escapements are summarized by bi-weekly time period and counts are boldfaced for the bi-weekly period in which the median date of migration occurred during the run year.

	Total	May		June		July		August		September		October	
Run year	escapement	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-31	01-15	16-30	01-15	16-31
1992	6	2	**3**	1	0	0	0	0	0	0	0	0	0
1993	2	0	**1**	1	0	0	0	0	0	0	0	0	0
1994	11	1	2	**3**	3	0	2	0	0	0	0	0	0
1995	11	0	0	3	1	**2**	2	1	1	0	0	1	0
1996	18	2	0	**12**	2	1	0	0	0	0	0	1	0
1997	6	0	2	0	**2**	2	0	0	0	0	0	0	0
1998	18	0	1	6	**3**	6	1	1	0	0	0	0	0
1999	28	0	2	5	**8**	10	1	1	1	0	0	0	0
2000	27	0	10	**11**	3	2	0	0	0	1	0	0	0
2001	12	1	**8**	2	1	0	0	0	0	0	0	0	0

Table 18. Age specific counts of wild bull trout escaping to an adult migrant trap operated at Powerdale Dam.

Run year	Sample size	Total age					
		3	4	5	6	7	8
1992	4	--	--	2	1	1	--
1993	2	--	--	--	2	--	--
1994	11	1	5	5	--	--	--
1995	10	--	6	4	--	--	--
1996	18	--	1	7	9	1	--
1997	4	--	1	3	--	--	--
1998	18	6	6	4	1	--	1
1999	26	--	3	21	2	--	--
2000	26	--	2	11	9	3	1
2001	11	1	2	6	2	--	--

Table 19. Mean fork length (cm), by age category, of upstream migrant bulltrout sampled at an adult migrant trap operated at Powerdale Dam.

Age, year	N	Fork length (cm) Mean	Range	95% C.I.
Age 3,				
1994	1	37.5	37.5	--
1998	6	37.2	35.5 - 40.5	± 2.2
2001	1	39.0	39.0	--
Age 4,				
1994	5	38.5	24.3 - 55.5	±14.6
1995	6	46.7	39.0 - 51.5	± 4.9
1996	1	50.0	50.0	--
1997	1	42.0	42.0	--
1998	6	38.9	37.5 - 40.0	± 0.9
1999	3	45.8	42.0 - 51.0	±11.5
2000	2	42.5	38.0 - 47.0	±54.2
2001	2	40.5	35.0 - 46.0	±66.2
Age 5,				
1992	2	48.4	45.2 - 51.5	±37.9
1994	5	41.9	37.0 - 53.0	± 8.1
1995	4	48.0	43.5 - 51.0	± 5.5
1996	7	50.6	49.0 - 55.5	± 2.0
1997	3	48.0	44.5 - 53.0	±11.0
1998	4	47.4	45.5 - 50.0	± 3.0
1999	21	49.5	38.0 - 56.0	± 2.1
2000	11	50.0	40.0 - 59.5	± 4.1
2001	6	49.0	43.0 - 55.0	± 5.0
Age 6,				
1992	1	56.0	56.0	--
1993	2	51.8	48.0 - 55.5	±45.1
1996	9	52.0	48.5 - 57.0	± 2.3
1998	1	58.5	58.5	--
1999	2	52.8	50.0 - 55.5	±33.1
2000	9	53.6	49.5 - 57.5	± 2.2
2001	2	50.8	48.5 - 53.0	±27.1
Age 7,				
1992	1	56.5	56.5	--
1996	1	53.5	53.5	--
2000	3	55.0	52.0 - 59.0	± 8.9
Age 8,				
1998	1	60.0	60.0	--
2000	1	63.0	63.0	--

Table 20. Mean weight (kg), by age category, of upstream migrant bull trout sampled at an adult migrant trap operated at Powerdale Dam.

Age, year	N	Weight (kg) Mean	Range	95% C.I.
Age 3,				
1994	1	0.8	0.8	--
1998	6	0.67	0.5 - 0.9	±0.17
2001	1	0.6	0.6	--
Age 4,				
1994	4	1.12	0.5 - 2.5	±1.51
1995	6	1.22	0.8 - 1.8	±0.38
1996	1	1.4	1.4	--
1997	1	1.0	1.0	--
1998	6	1.17	0.6 - 3.5	±1.20
1999	3	1.27	1.0 - 1.7	±0.94
2000	2	1.00	0.7 - 1.3	±3.61
2001	2	0.9	0.5 - 1.3	±4.81
Age 5,				
1994	5	0.88	0.5 - 1.6	±0.54
1995	4	1.30	1.0 - 1.5	±0.39
1996	7	1.60	1.3 - 2.2	±0.26
1997	3	1.30	1.1 - 1.7	±0.86
1998	4	1.30	1.2 - 1.4	±0.13
1999	20	1.51	0.6 - 2.2	±0.21
2000	11	1.55	0.8 - 2.4	±0.34
2001	6	1.38	1.0 - 1.8	±0.33
Age 6,				
1996	9	1.72	1.5 - 2.2	±0.22
1998	1	2.2	2.2	--
1999	2	1.95	1.5 - 2.4	±5.42
2000	9	1.98	1.5 - 2.6	±0.32
2001	2	1.45	1.3 - 1.6	±1.81
Age 7,				
1996	1	1.8	1.8	--
2000	3	2.10	1.7 - 2.5	±0.99
Age 8,				
1998	1	2.4	2.4	--
2000	1	3.0	3.0	--

Table 21. Bi-weekly counts of adult summer steelhead captured at the Powerdale Dam trap, by origin, stock, and run year. Bi-weekly counts are reported for March through December. The bi-weekly count in which the median date of migration occurred is boldfaced for completed run years (i.e., the 1992-1993 through 2000-2001 run years).

Origin, stock, run year	March		April		May		June		July		August		September		October		November		December			
	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-30	01-15	16-31	Jan-May	Total
Wild,																						
Hood River,																						
1992-1993	0	1	12	6	7	21	31	68	49	**49**	37	18	17	55	25	24	38	12	2	1	4	477
1993-1994	0	1	10	5	8	21	13	21	25	**26**	14	10	8	5	11	8	1	1	10	0	30	228
1994-1995	0	1	3	4	9	7	22	25	**32**	33	11	1	4	8	2	7	5	0	0	0	9	183
1995-1996[a]	0	0	0	0	2	1	4	6	37	**19**	16	2	5	5	2	8	0	8	0	0	7	122
1996-1997	0	0	0	1	3	3	12	17	31	**32**	14	6	6	5	16	10	7	0	0	1	5	169
1997-1998	0	0	0	0	1	1	1	4	6	6	**14**	2	4	7	9	2	8	0	0	0	0	65
1998-1999	0	0	0	1	3	2	5	13	15	17	**7**	5	5	7	7	4	3	13	1	0	11	119
1999-2000	0	0	1	0	1	5	7	6	19	28	11	5	0	**8**	8	3	35	8	7	0	24	176
2000-2001[b]	0	0	1	3	2	12	13	39	20	**22**	14	9	10	23	3	26	1	0	0	0	4	202
2001-2002[c]	1	0	8	19	10	43	37	27	51	35	23	16	11	11	15	48	51	28	7	6	--	447
Subbasin hatchery,																						
Foster,																						
1992-1993	0	8	48	82	131	190	136	**279**	254	220	136	28	26	55	24	10	15	4	1	4	20	1,671
1993-1994	0	1	13	38	83	120	75	151	**188**	166	113	33	23	8	16	10	0	1	11	0	19	1,069
1994-1995	0	4	13	79	124	164	269	**299**	323	166	26	10	13	17	17	12	12	4	0	0	20	1,572
1995-1996[a]	0	0	4	0	5	12	30	31	**211**	101	52	13	15	5	9	4	1	10	0	2	6	511
1996-1997	0	2	39	29	123	153	**305**	190	259	120	26	15	3	3	9	7	4	0	0	1	8	1,296
1997-1998	0	0	0	11	36	59	23	66	**109**	68	112	21	17	25	9	3	2	0	0	0	3	564
1998-1999	0	1	2	21	20	25	88	60	**111**	103	16	12	19	15	5	7	2	10	0	0	7	524
1999-2000	0	0	3	9	2	31	20	64	75	**121**	65	20	3	3	7	2	10	1	3	0	21	460
2000-2001[b]	2	11	43	68	77	179	155	**228**	170	111	41	23	19	8	0	9	2	0	0	0	5	1,151
2001-2002[c]	3	22	48	238	192	323	226	205	162	101	46	15	3	6	14	31	27	50	3	6	--	1,721
Hood River,																						
2000-2001[b]	0	0	0	0	0	0	0	0	0	0	1	1	**3**	1	0	1	0	0	0	0	0	7
2001-2002[c]	0	0	0	3	2	10	16	17	30	25	31	9	8	28	31	62	69	24	0	2	--	367

Table 21. Continued.

Origin, stock, run year	March 01-15	March 16-31	April 01-15	April 16-30	May 01-15	May 16-31	June 01-15	June 16-30	July 01-15	July 16-31	August 01-15	August 16-31	September 01-15	September 16-30	October 01-15	October 16-31	November 01-15	November 16-30	December 01-15	December 16-31	Jan-May	Total
Stray hatchery,																						
Unknown,																						
1992-1993	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	4	5
1993-1994	0	0	0	1	0	0	2	2	**3**	0	0	2	0	0	1	0	0	0	1	0	1	13
1994-1995	0	0	0	0	0	**2**	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	4
1995-1996[a]	0	0	0	0	0	0	0	1	0	**2**	0	0	0	0	0	0	1	1	0	0	0	5
1996-1997	0	0	0	0	0	0	2	1	2	0	0	2	0	0	**1**	4	1	0	0	0	2	15
1997-1998	0	0	0	0	0	0	0	0	0	0	1	0	0	0	**2**	2	1	0	0	0	0	6
1998-1999	0	1	0	0	0	0	0	0	0	1	0	0	2	**5**	1	0	0	0	0	0	1	11
1999-2000	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	1	0	0	0	2
2000-2001[b]	0	0	0	1	1	0	0	0	0	0	0	0	0	**5**	0	2	2	0	0	0	0	11
2001-2002[c]	0	0	0	0	0	0	3	3	1	3	2	0	1	1	3	16	11	2	0	1	--	47
Unknown,																						
Unknown,																						
1992-1993	1	2	1	0	3	4	1	3	7	4	4	1	**4**	17	2	4	7	0	0	1	2	68
1993-1994	0	0	0	0	1	0	0	8	**15**	3	3	4	1	1	1	0	0	0	0	2	7	46
1994-1995	0	0	1	5	6	11	17	**16**	17	10	1	0	11	0	1	1	2	0	0	0	1	100
1995-1996[a]	0	0	0	0	0	0	1	4	15	**6**	13	0	0	1	0	1	0	5	0	0	1	47
1996-1997	0	0	1	0	2	6	14	3	**14**	17	5	1	3	2	1	3	0	0	0	0	1	73
1997-1998	0	0	1	0	4	4	2	5	**7**	4	9	1	2	1	1	0	2	0	1	0	0	44
1998-1999	0	0	0	4	5	3	3	3	4	**6**	2	0	0	1	2	2	2	3	1	1	3	45
1999-2000	0	0	0	0	0	1	2	2	12	**8**	2	0	0	1	0	0	3	1	1	0	3	36
2000-2001[b]	0	0	0	2	3	2	1	9	3	**3**	0	3	1	3	1	4	2	0	0	0	4	41
2001-2002[c]	0	0	3	9	7	15	13	10	7	5	2	0	1	1	2	6	9	4	0	1	--	95

[a] Powerdale Dam trap was inoperative from 11-13 November, 1995 and from 20-24 November, 1995 because of flood damage and from 28 November, 1995 through 27 February, 1996 for modifications to the adult fish ladder.

[b] The Powerdale Dam trap was inoperative from 31 September, 2000 through 24 October, 2000 due to flooding and heavy movement of glacial silt through the subbasin.

[c] Preliminary estimates. Summaries are complete through 31 December, 2001.

Table 22. Bi-weekly counts of adult summer steelhead captured at the Powerdale Dam trap; by origin, stock, and run year. Bi-weekly counts are reported for January through May. The bi-weekly count in which the median date of migration occurred is boldfaced for completed run years (i.e., the 1992-1993 through 2000-2001 run years).

Origin, stock, run year	Mar-Dec	January		February		March		April		May		Total
		01-15	16-31	01-15	16-29	01-15	16-31	01-15	16-30	01-15	16-31	
Wild,												
Hood River,												
1992-1993	473	0	1	0	0	1	1	0	0	1	0	477
1993-1994	198	16	2	0	1	2	1	2	6	0	0	228
1994-1995	174	0	0	5	1	1	1	1	0	0	0	183
1995-1996	115	0	0	0	0	1	0	1	4	1	0	122
1996-1997	164	0	0	0	4	0	1	0	0	0	0	169
1997-1998	65	0	0	0	0	0	0	0	0	0	0	65
1998-1999	108	8	0	0	0	1	1	0	1	0	0	119
1999-2000	152	2	0	4	1	1	2	8	5	0	1	176
2000-2001	198	0	0	0	0	0	2	2	0	0	0	202
2001-2002[a]	447	--	--	--	--	--	--	--	--	--	--	447
Subbasin hatchery,												
Foster,												
1992-1993	1,651	0	0	0	0	0	3	12	4	1	0	1,671
1993-1994	1,050	4	1	0	0	0	2	5	7	0	0	1,069
1994-1995	1,552	0	4	2	3	6	2	0	3	0	0	1,572
1995-1996	505	0	0	0	0	4	0	1	1	0	0	511
1996-1997	1,288	0	0	0	3	0	1	2	1	1	0	1,296
1997-1998	561	1	0	0	0	1	0	1	0	0	0	564
1998-1999	517	5	0	1	0	0	0	0	1	0	0	524
1999-2000	439	1	0	2	2	7	2	5	2	0	0	460
2000-2001	1,146	1	0	0	0	1	0	2	1	0	0	1,151
2001-2002[a]	1,721	--	--	--	--	--	--	--	--	--	--	1,721
Hood River,												
2000-2001	7	0	0	0	0	0	0	0	0	0	0	7
2001-2002[a]	367	--	--	--	--	--	--	--	--	--	--	367
Stray hatchery,												
Unknown,												
1992-1993	1	0	0	0	0	1	**1**	2	0	0	0	5
1993-1994	12	0	0	0	0	0	0	1	0	0	0	13
1994-1995	3	0	0	0	0	0	0	1	0	0	0	4
1995-1996	5	0	0	0	0	0	0	0	0	0	0	5
1996-1997	13	0	0	0	1	0	0	0	1	0	0	15
1997-1998	6	0	0	0	0	0	0	0	0	0	0	6
1998-1999	10	0	0	1	0	0	0	0	0	0	0	11
1999-2000	2	0	0	0	0	0	0	0	0	0	0	2
2000-2001	11	0	0	0	0	0	0	0	0	0	0	11
2001-2002[a]	47	--	--	--	--	--	--	--	--	--	--	47

Table 22. Continued.

Origin, stock, run year	Mar-Dec	January 01-15	January 16-31	February 01-15	February 16-29	March 01-15	March 16-31	April 01-15	April 16-30	May 01-15	May 16-31	Total
Unknown, Unknown,												
1992-1993	66	0	1	1	0	0	0	0	0	0	0	68
1993-1994	39	1	1	0	0	1	0	2	2	0	0	46
1994-1995	99	0	0	0	0	0	0	1	0	0	0	100
1995-1996	46	0	0	0	0	0	0	0	1	0	0	47
1996-1997	72	0	0	0	0	0	1	0	0	0	0	73
1997-1998	44	0	0	0	0	0	0	0	0	0	0	44
1998-1999	42	3	0	0	0	0	0	0	0	0	0	45
1999-2000	33	0	0	0	0	0	0	3	0	0	0	36
2000-2001	37	0	0	1	0	0	3	0	0	0	0	41
2001-2002[a]	95	--	--	--	--	--	--	--	--	--	--	95

[a] Preliminary estimates. Summaries are complete through 31 December, 2001.

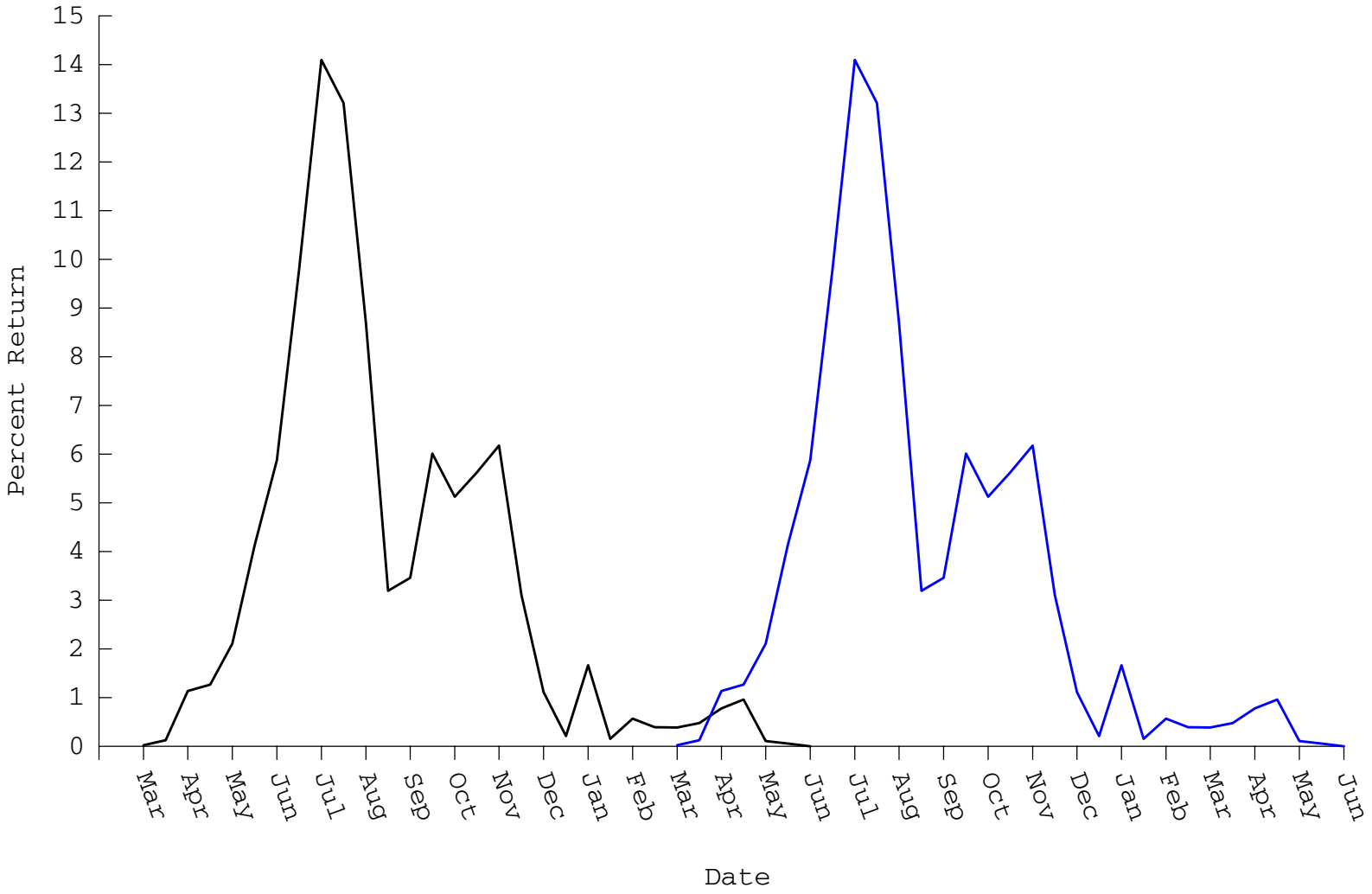

Figure 10. Bi-weekly returns of wild adult summer steelhead as a percentage of the total run for the 1992-1993 through 2000-2001 run years. Estimates are an average of the run year specific percentages escaping to the Powerdale Dam trap.

Table 23. Estimated harvest of adult summer steelhead in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2000. Confidence limits (95%) are in parenthesis. Run year specific estimates are presented in **Appendix F.**

	Wild summer steelhead		Subbasin hatchery summer steelhead		Catch Rate
Period	Kept	Released[a]	Kept	Released	(hrs/fish)
Jan 1-15	--	15 (11.6)	21 (12.7)	18 (11.3)	11
Jan 16-31	--	13 (12.3)	1 (1.6)	10 (8.5)	42
Feb 1-15	--	5 (5.1)	7 (10.9)	2 (3.2)	74
Feb 16-29	--	8 (7.7)	3 (5.3)	7 (6.7)	56
Mar 1-15	--	12 (10.5)	4 (4.2)	3 (4.5)	60
Mar 16-31	--	22 (16.4)	31 (18.3)	12 (12.0)	28
Apr 1-15	--	38 (21.5)	39 (17.6)	5 (4.5)	19
Apr 16-30	--	17 (13.5)	21 (17.2)	--	45
May 1-15	--	14 (17.5)	104 (77.3)	--	20
May 16-31	--	1 (1.8)	47 (24.6)	10 (14.8)	28
Jun 1-15	--	14 (7.7)	53 (22.7)	10 (7.1)	19
Jun 16-30	--	7 (4.8)	54 (19.8)	4 (5.6)	17
Jul 1-15	--	13 (15.9)	20 (15.7)	23 (19.2)	14
Jul 16-31	--	--	4 (8.4)	4 (8.4)	49
Aug 1-15	--	4 (7.4)	6 (6.8)	--	17
Aug 16-31	--	--	27 (35.6)	3 (4.7)	12
Sep 1-15	--	--	3 (4.5)	5 (7.9)	52
Sep 16-30	--	--	--	6 (8.9)	30
Oct 1-15[b]	--	--	--	--	--
Oct 16-31[b]	--	--	--	--	--
Nov 1-15[b]	--	--	--	--	--
Nov 16-30[b]	--	--	--	--	--
Dec 1-15[b]	--	--	--	--	--
Dec 16-31	--	--	11 (13.4)	--	20
Total	0	183 (46)	456 (103)	122 (37)	25[c]

[a] Estimate may include wild winter steelhead and maxillary clipped (i.e., left or right maxillary clipped) hatchery summer steelhead mis-identified by the fisher as a wild steelhead.

[b] The Hood River subbasin was virtually un-fishable below Powerdale Dam due to heavy sediment load resulting from the Newton Creek glacial blowout on 29 September, 2000. No creel was conducted during this time period.

[c] Estimate of mean catch rate is for the period 1 January - 30 September and 16 December - 31 December.

Table 24. Estimated harvest of adult summer steelhead in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2001. Confidence limits (95%) are in parenthesis. Run year specific estimates are presented in **Appendix F.**

	Wild summer steelhead		Subbasin hatchery summer steelhead		Catch Rate
Period	Kept	Released[a]	Kept	Released	(hrs/fish)
Jan 1-15	--	--	--	3 (4.2)	38
Jan 16-31	--	7 (10.1)	10 (11.8)	--	20
Feb 1-15	--	--	--	--	--
Feb 16-28	--	--	9 (11.3)	--	87
Mar 1-15	--	--	--	9 (13.7)	73
Mar 16-31	--	--	30 (29.6)	--	42
Apr 1-15	--	--	200 (124)	14 (20.2)	10
Apr 16-30	--	8 (14.0)	47 (32.3)	4 (7.5)	26
May 1-15	--	--	37 (24.3)	6 (10.6)	26
May 16-31	4 (8.4)	10 (16.6)	73 (47.8)	--	21
Jun 1-15	--	12 (10.1)	115 (30.6)	17 (8.6)	13
Jun 16-30	--	21 (29.5)	78 (40.9)	10 (14.6)	15
Jul 1-15	--	2 (2.5)	4 (3.5)	--	86
Jul 16-31	--	--	2 (3.4)	2 (3.3)	102
Aug 1-15	--	5 (8.0)	5 (8.1)	--	21
Aug 16-31	--	--	--	--	--
Sep 1-15	--	--	--	4 (6.4)	30
Sep 16-30	--	--	--	--	--
Oct 1-15	--	--	2 (2.9)	--	46
Oct 16-31	--	--	--	2 (2.8)	38
Nov 1-15	--	16 (9.4)	5 (5.2)	28 (18.8)	7
Nov 16-30	--	12 (14.7)	29 (21.2)	11 (9.3)	12
Dec 1-15	--	17 (19.1)	42 (33.2)	23 (19.2)	15
Dec 16-31	--	56 (27.4)	31 (19.5)	26 (19.1)	20
Total	4 (8.4)	166 (55)	719 (158)	159 (48)	19[b]

[a] Estimate may include wild winter steelhead and maxillary clipped (i.e., left or right maxillary clipped) hatchery summer steelhead mis-identified by the fisher as a wild steelhead.

[b] Estimate of mean catch rate is for the period 1 January - 31 December.

Table 25. Adult summer steelhead escapements to the Powerdale Dam trap; by origin, stock, run year, and age category. Fish of unknown origin were allocated to origin categories based on scale analysis and the ratio of fish of known origin (*see* **METHODS**).

Origin, stock, run year	Total escapement	Freshwater/Ocean age												Repeat spawners
		1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	
Wild,														
Hood River,														
1992-1993	490	0	26	6	5	309	77	1	0	48	0	--	0	18
1993-1994	245	0	11	5	1	109	44	0	2	53	7	--	3	10
1994-1995	219	0	5	2	0	81	70	0	0	34	12	--	0	15
1995-1996	132	0	15	2	0	82	11	0	0	18	1	--	0	3
1996-1997	183	0	7	2	2	129	22	0	0	14	2	--	0	5
1997-1998	79	0	8	1	1	42	13	0	0	7	0	--	0	7
1998-1999	132	0	14	0	2	75	16	0	0	13	0	--	0	12
1999-2000	187	2	26	6	1	108	15	0	0	19	1	--	0	9
2000-2001	218	0	23	6	4	101	59	1	2	6	2	--	0	14
Subbasin hatchery,														
Foster,														
1992-1993	1,726	48	0	--	1,513	0	--	--	150	1	--	1	--	13
1993-1994	1,098	35	0	--	818	0	--	--	235	0	--	3	--	7
1994-1995	1,636	12	0	--	1,352	1	--	--	259	0	--	0	--	12
1995-1996	548	59	0	--	420	1	--	--	61	0	--	0	--	7
1996-1997	1,352	8	0	--	1,251	6	--	--	79	0	--	0	--	8
1997-1998	594	10	0	--	543	0	--	--	37	0	--	0	--	4
1998-1999	556	25	0	--	374	0	--	--	140	0	--	0	--	17
1999-2000	485	33	3	--	360	0	--	--	76	0	--	1	--	12
2000-2001	1,176	34	0	--	1,077	2	--	--	49	0	--	0	--	14
Hood River,														
2000-2001	7	7	--	--	--	--	--	--	--	--	--	--	--	--

Table 25. Continued.

Origin, stock, run year	Total escapement	Freshwater/Ocean age												Repeat spawners
		1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	
Stray hatchery,														
Unknown,														
1992-1993	5	3	--	--	2	0	--	--	0	--	--	--	--	0
1993-1994	13	1	--	--	10	0	--	--	2	--	--	--	--	0
1994-1995	4	0	--	--	1	0	--	--	3	--	--	--	--	0
1995-1996	5	2	--	--	0	0	--	--	2	--	--	--	--	1
1996-1997	18	1	--	--	16	0	--	--	1	--	--	--	--	0
1997-1998	6	2	--	--	4	0	--	--	0	--	--	--	--	0
1998-1999	11	1	--	--	8	0	--	--	2	--	--	--	--	0
1999-2000	2	0	--	--	2	0	--	--	0	--	--	--	--	0
2000-2001	11	0	--	--	9	1	--	--	1	--	--	--	--	0

Table 26. Disposition of adult summer steelhead returning for the first time to the Powerdale Dam trap. Counts of wild and hatchery[a] adult steelhead may include marked and unmarked summer steelhead, respectively. Origin was determined based on scale analysis (see METHODS).

	Returns to Powerdale Dam		Broodstock collection[b]				Numbers passed above Powerdale Dam		Numbers recycled below Powerdale Dam		Mortalities		Transfers[c]	
			By origin		By sex									
Run year	Wild	Hatchery	Wild	Hatchery	Males	Females	Wild	Hatchery	Wild	Hatchery[d]	Wild	Hatchery	Wild	Hatchery
1992-1993	490	1,731	--	--	--	--	489	1,722	--	5	1	4	--	--
1993-1994	245	1,111	--	--	--	--	243	1,105	1	4	1	2	--	--
1994-1995	219	1,640	--	--	--	--	218	1,635	--	1	1	4	--	--
1995-1996	132	553	--	--	--	--	131	521	1	28	--	4	--	--
1996-1997	183	1,370	--	--	--	--	178	1,315	2	50	3	5	--	--
1997-1998	79	600	13(3)	3(3)	5(3)	11(3)	63	448	2	142	1	7	--	--
1998-1999	132	567	31(9)	3	13(2)	21(7)	100	2	--	549(14)	1	13	--	--
1999-2000	187	487	33	--	12	21	146	2	7	467(7)	1	15	--	3
2000-2001	218	1,194	27(3)	--	11	16(3)	177	1	6	1,167(199)	8	20	--	6
2001-2002[e]	460	2,217	59(11)	5(3)	30(4)	34(10)	388	114	13	2,093(6)	--	5	--	--

[a] Subbasin hatchery summer steelhead returning in the 1992-1993 through 1999-2000 run years were entirely from Foster stock hatchery production releases. Hood River stock hatchery summer steelhead first returned in the 2000-2001 run year as 1 salt adults.

[b] Pre-spawning mortalities are included in the totals and listed in parenthesis.

[c] Adults were transferred to Kingsley Reservoir or Taylor Lake upon first return to Powerdale Dam.

[d] Recycled fish returning more than three times to Powerdale Dam may be killed (i.e., depending on the condition of the fish) or transferred to either Kingsley Reservoir or Taylor Lake. The total number of adults, falling into either of these three categories, are summarized in parenthesis and included in the total number of recycled fish.

[e] Preliminary estimate through 31 December, 2001.

Table 27. Number of adult summer steelhead captured at the Powerdale Dam trap and transported for release (recycled) at the mouth of the Hood River. Number of recaptures (N) and percent return (%) are given for each successive recapture at the Powerdale Dam trap. Percent return is estimated after mortalities, adults taken for brood stock, fish transfers, fish with lost tags, and recycled fish subsequently passed above Powerdale Dam have been subtracted from the previous recapture count.

		Number of successive returns to the Powerdale Dam trap of recycled adult summer steelhead[a]																													
	Total no.	1		2		3		4		5		6		7		8		9		10		11		12		13		14		15	
Run year	of recycles[b]	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1995-1996	29	9	31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1996-1997	52	22	42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1997-1998	144	41	28	12	30	3	25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1998-1999	549	315	57	199	65	117	60	63	55	25	40	9	36	6	67	2	33	1	50	--	--	--	--	--	--	--	--	--	--	--	--
1999-2000	474	281	59	160	58	91	57	52	57	29	56	18	62	9	50	7	78	4	57	3	75	1	33	--	--	--	--	--	--	--	--
2000-2001	1,173	813	69	526	70	354	73	251	75	166	75	106	68	76	75	48	71	37	80	24	80	14	67	7	54	4	80	2	50	1	100
2001-2002[c]	2,106	1,227	58	727	59	445	61	251	57	152	61	95	62	59	62	34	58	19	56	9	47	6	67	3	50	3	100	2	67	1	50

[a] Numbers do not include recycled adults that were recaptured untagged, or untagged recycles that were re-tagged and subsequently recaptured one or more times at the Powerdale Dam trap.

[b] Numbers do not include adults that were inadvertently recycled untagged, or adults that were classified as first time returning fish but had what appeared to be a tag hole from a recently applied tag (i.e., a lost tag).

[c] Preliminary estimate through 31 December 2001.

Table 28. Average number of days to return to the Powerdale Dam trap of adult summer steelhead captured at the Powerdale Dam trap and transported for release (recycled) at the mouth of the Hood River.

Run year	Total no. of recycles	Number of successive returns to the Powerdale Dam trap of recycled adult summer steelhead														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1995-1996	29	26	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1996-1997	52	26	--	--	--	--	--	--	--	--	--	--	--	--	--	--
1997-1998	144	22	29	21	--	--	--	--	--	--	--	--	--	--	--	--
1998-1999	549	17	18	20	17	21	20	24	16	12	--	--	--	--	--	--
1999-2000	474	17	15	21	17	13	19	26	11	13	15	68	--	--	--	--
2000-2001	1,173	14	14	13	13	12	11	10	9	14	12	13	13	9	24	26
2001-2002[a]	2,106	14	13	14	15	14	13	20	13	17	11	21	14	13	18	16

[a] Preliminary estimate through 31 December, 2001.

Table 29. Adult summer steelhead escapements to the Powerdale Dam trap; by origin, stock, brood year, and ocean age category. Brood years are bold faced for those years in which brood year specific estimates of escapement are complete. (Percent smolt to adult return is in parentheses. Estimates are based on returns in the 1992-1993 through 2000-2001 run years.)

Origin, stock, brood year[a]	Smolts	Ocean age				Repeat spawners
		1 salt	2 salt	3 salt	4 salt	
Wild,						
Hood River,						
1986	--	--	1	0	0	4
1987	--	0	77	55	3	19
1988	--	6	353	65	0	15
1989	--	31	184	37	0	8
1990	--	13	93	20	0	4
1991	--	7	104	14	0	4
1992	--	17	142	7	0	4
1993	1,165	8 (0.69)	60 (5.15)	14 (1.20)	0	16 (1.37)
1994	2,750	8 (0.29)	92 (3.35)	21 (0.76)	0	13 (0.47)
1995	--	20	169	6	--	3
1996	--	32	102	2	--	3
1997	--	25	4	--	--	--
1998	--	0	--	--	--	--
Subbasin hatchery,						
Foster,						
1987	79,867	--	--	1 (0.001)	1 (0.001)	--
1988	89,026	--	--	150 (0.17)	3 (0.003)	13 (0.01)
1989	81,795	--	1,513 (1.85)	235 (0.29)	0	7 (0.01)
1990	77,132	48 (0.06)	819 (1.06)	259 (0.34)	0	12 (0.02)
1991	99,973	35 (0.04)	1,353 (1.35)	61 (0.06)	0	11 (0.01)
1992	70,928	12 (0.02)	426 (0.60)	79 (0.11)	0	6 (0.01)
1993	90,042	59 (0.07)	1,251 (1.39)	37 (0.04)	0	7 (0.01)
1994	76,330	8 (0.01)	543 (0.71)	140 (0.18)	1 (0.001)	17 (0.02)
1995	68,378	10 (0.01)	374 (0.55)	76 (0.11)	0	9 (0.01)
1996	60,993	28 (0.05)	362 (0.59)	49 (0.08)	--	9 (0.01)
1997	64,910	33 (0.05)	1,077 (1.66)	--	--	3 (<0.01)
1998	62,218	34 (0.05)	--	--	--	--
1999	49,278	--	--	--	--	--
2000	62,354	--	--	--	--	--
Hood River,[b]						
1998	19,513	7 (0.04)	--	--	--	--
1999	33,899	--	--	--	--	--
2000	37,665	--	--	--	--	--

Table 29. Continued.

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[a] Complete brood returns are available beginning with the 1989 wild and 1990 hatchery broods, as determined based on age structure for adult summer steelhead sampled at the Powerdale Dam trap. Estimates of escapement for prior brood years do not include adult returns from all possible age categories.

[b] Hood River stock hatchery smolts are volitionally released from acclimation facilities located in the Hood River subbasin. Hatchery smolts are held at the facilities for up to two weeks prior to release.

Table 30. Estimates of Foster and Hood River stock hatchery summer steelhead subbasin smolt production releases, adult escapements to the mouth of the Hood River, smolt to adult survival rate, and percent difference from the wild smolt to adult survival rate. Estimates are by year of migration. Year of migration is bold faced for those years in which estimates of adult escapements back to the mouth of the Hood River subbasin are more than 98% complete.

	Foster stock hatchery summer steelhead					Hood River stock hatchery summer steelhead				
Year of smolt migration	Smolts[a]	Adult returns: Run years[b]	Adult returns: No.	Smolt to adult survival: Percent survival	Smolt to adult survival: Δ% from wild est.	Smolts[c]	Adult returns: Run years[b]	Adult returns: No.	Smolt to adult survival: Percent survival	Smolt to adult survival: Δ% from wild est.
1994	90,042	1995/96-2000/01	2,080	2.31	-67.23	--	--	--	--	--
1995	76,330	1996/97-2001/02	1,025	1.34	-85.82	--	--	--	--	--
1996	68,378	1997/98-2001/02	666	0.97	-83.64	--	--	--	--	--
1997	60,993	1998/99-2001/02	561	0.92	-74.86	--	--	--	--	--
1998	64,910	1999/00-2001/02	1,634	2.52	-58.62	--	--	--	--	--
1999	62,218	2000/01-2001/02	1,955	3.14	-50.00	19,513	2000/01-2001/02	293	1.50	-76.11
2000	49,278	2001/02	81	0.16	-84.76	33,899	2001/02	137	0.40	-61.90

[a] Production releases of Foster stock hatchery summer steelhead smolts were direct released into the West Fork of the Hood River from 1994-1997. Annual production releases were made below Powerdale Dam (RM 4.5) beginning in 1998.

[b] Escapements in the 2001-2002 run year are preliminary estimates through 31 December, 2001.

[c] Hood River stock hatchery summer steelhead smolts were first released into the Hood River subbasin in 1999 (1998 brood). The entire production release is acclimated from one to two weeks prior to being volitionally released into the West Fork of the Hood River.

Table 31. Age composition (percent) of adult summer steelhead sampled at the Powerdale Dam trap; by origin, stock, run year, and age category. Estimates in a given run year may not add to 100% due to rounding error.

Origin, stock, run year	N	Freshwater/Ocean age												Repeat spawners
		1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	
Wild,														
Hood River,														
1992-1993	477	0	5.2	1.3	1.0	62.9	15.9	0.2	0	9.6	0	--	0	3.8
1993-1994	222	0	4.5	2.3	0.5	44.6	18.5	0	0.9	20.7	3.2	--	1.4	3.6
1994-1995	177	0	2.3	0.6	0	40.1	31.1	0	0	13.0	5.1	--	0	7.9
1995-1996	121	0	11.6	1.7	0	62.8	7.4	0	0	14.0	0.8	--	0	1.7
1996-1997	169	0	3.6	1.2	1.2	71.0	11.2	0	0	7.7	1.2	--	0	3.0
1997-1998	65	0	9.2	1.5	1.5	55.4	13.8	0	0	9.2	0	--	0	9.2
1998-1999	119	0	10.9	0	1.7	56.3	11.8	0	0	10.1	0	--	0	9.2
1999-2000	176	1.1	14.2	2.3	0.6	59.1	8.0	0	0	9.1	0.6	--	0	5.1
2000-2001	200	0	10.0	2.5	2.0	47.5	26.0	0.5	1.0	3.0	1.0	--	0	6.5
Subbasin hatchery,														
Foster,														
1992-1993	1,670	2.8	0	--	87.8	0	--	--	8.6	0	--	0.1	--	0.8
1993-1994	1,069	3.3	0	--	74.4	0	--	--	21.4	0	--	0.3	--	0.7
1994-1995	1,567	0.7	0	--	83.2	0.1	--	--	15.3	0	--	0	--	0.8
1995-1996	510	11.2	0	--	76.5	0.2	--	--	10.8	0	--	0	--	1.4
1996-1997	1,296	0.5	0	--	92.5	0.5	--	--	5.9	0	--	0	--	0.6
1997-1998	563	1.6	0	--	91.5	0	--	--	6.2	0	--	0	--	0.7
1998-1999	524	4.6	0	--	67.9	0	--	--	24.2	0	--	0	--	3.2
1999-2000	460	7.0	0.7	--	73.9	0	--	--	15.7	0	--	0.2	--	2.6
2000-2001	1,151	2.7	0	--	91.7	0.2	--	--	4.2	0	--	0	--	1.2
Hood River,														
2000-2001	7	100	--	--	--	--	--	--	--	--	--	--	--	--

Table 31. Continued.

Origin, stock, run year	N	Freshwater/Ocean age												Repeat spawners
		1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	
Stray hatchery,														
Unknown,														
1992-1993	5	60.0	--	--	40.0	0	--	--	0	--	--	--	--	0
1993-1994	14	7.1	--	--	71.4	0	--	--	14.3	--	--	--	--	7.1
1994-1995	4	0	--	--	25.0	0	--	--	75.0	--	--	--	--	0
1995-1996	5	40.0	--	--	0	0	--	--	40.0	--	--	--	--	20.0
1996-1997	15	6.7	--	--	86.7	0	--	--	6.7	--	--	--	--	0
1997-1998	6	33.3	--	--	66.7	0	--	--	0	--	--	--	--	0
1998-1999	11	9.1	--	--	72.7	0	--	--	18.2	--	--	--	--	0
1999-2000	2	0	--	--	100	0	--	--	0	--	--	--	--	0
2000-2001	11	0	--	--	81.8	9.1	--	--	9.1	--	--	--	--	0

Table 32. Mean fork length (cm) of wild adult summer steelhead with spawning checks; by sample population (i.e., sex) and age category. Fish were sampled from the 1999-2000 run year of summer steelhead escaping to the adult trap located at Powerdale Dam.

Sample pop.,	Freshwater/Ocean age				
statistic	3/2S.3	2/2S.4	2/3S.4	2/2S.3	3/1S.2
Females,					
N	1	2	1	4	1
Mean	74.0	78.75	78.5	71.25	67.0
STD	--	1.06	--	7.27	--
Range	74.0	78.0-79.5	78.5	62.0-78.0	67.0
Males,					
N	--	--	--	--	--
Mean	--	--	--	--	--
STD	--	--	--	--	--
Range	--	--	--	--	--
Totals,					
N	1	2	1	4	1
Mean	74.0	78.75	78.5	71.25	67.0
STD	--	1.06	--	7.27	--
Range	74.0	78.0-79.5	78.5	62.0-78.0	67.0

Table 33. Mean fork length (cm) of subbasin hatchery adult summer steelhead (i.e., Foster stock) with spawning checks; by sample population (i.e., sex) and age category. Fish were sampled from the 1999-2000 run year of summer steelhead escaping to the adult trap located at Powerdale Dam.

Sample pop.,	Freshwater/Ocean age			
statistic	1/2S.4	1/3S.4	1/1S.2	1/2S.3
Females,				
N	3	1	1	--
Mean	73.67	77.0	59.5	--
STD	2.31	--	--	--
Range	71.0-75.0	77.0	59.5	--
Males,				
N	1	1	--	5
Mean	90.5	86.5	--	76.80
STD	--	--	--	2.97
Range	90.5	86.5	--	74.0-81.5
Totals,				
N	4	2	1	5
Mean	77.88	81.75	59.5	76.80
STD	8.63	6.72	--	2.97
Range	71.0-90.5	77.0-86.5	59.5	74.0-81.5

Table 34. Mean fork length (cm) of wild adult summer steelhead with spawning checks; by sample population (i.e., sex) and age category. Fish were sampled from the 2000-2001 run year of summer steelhead escaping to the adult trap located at Powerdale Dam.

Sample pop.,	Freshwater/Ocean age						
statistic	2/2S.4	3/2S.3	2/2S.3S.4	2/1S.3	2/1S.2	2/3S.4	2/1S.2S.3
Females,							
N	4	1	1	1	2	--	--
Mean	78.62	75.5	84.0	68.0	66.75	--	--
STD	6.02	--	--	--	6.01	--	--
Range	73.0-86.0	75.5	84.0	68.0	62.5-71.0	--	--
Males,							
N	--	--	--	1	1	1	1
Mean	--	--	--	75.0	68.0	87.5	57.5
STD	--	--	--	--	--	--	--
Range	--	--	--	75.0	68.0	87.5	57.5
Totals,							
N	4	1	1	2	3	1	1
Mean	78.62	75.5	84.0	71.50	67.17	87.5	57.5
STD	6.02	--	--	4.95	4.31	--	--
Range	73.0-86.0	75.5	84.0	68.0-75.0	62.5-71.0	87.5	57.5

Table 35. Mean fork length (cm) of subbasin hatchery adult summer steelhead (i.e., Foster stock) with spawning checks; by sample population (i.e., sex) and age category. Fish were sampled from the 2000-2001 run year of summer steelhead escaping to the adult trap located at Powerdale Dam.

Sample pop.,	Freshwater/Ocean age		
statistic	1/2S.4	1/2S.3	1/1S.2
Females,			
N	2	5	1
Mean	73.75	67.80	67.5
STD	13.08	3.77	--
Range	64.5-83.0	64.0-74.0	67.5
Males,			
N	1	2	2
Mean	78.0	69.50	71.00
STD	--	0	0.71
Range	78.0	139.0	70.5-71.5
Totals,			
N	3	7	3
Mean	75.17	68.29	69.83
STD	9.57	3.19	2.08
Range	64.5-83.0	64.0-74.0	67.5-71.5

Table 36. Mean fork length (cm) of adult summer steelhead without spawning checks; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 1999-2000 run year of summer steelhead escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop., statistic	Freshwater/Ocean age										Sample[a] mean
	1/1	1/2	1/3	1/4	2/1	2/2	2/3	3/1	3/2	3/3	
Wild,											
Hood River,											
Females,											
N	--	--	--	--	13	67	11	4	4	1	109
Mean	--	--	--	--	60.04	70.67	73.73	56.00	72.75	75.5	69.53
STD	--	--	--	--	3.91	4.31	5.16	2.45	4.87	--	6.44
Range	--	--	--	--	54.0-65.5	57.5-81.5	63.0-83.0	53.0-59.0	67.0-77.5	75.5	53.0-83.0
Males,											
N	2	1	--	--	12	37	5	--	10	--	67
Mean	59.00	81.0	--	--	58.42	72.47	78.30	--	70.75	--	69.86
STD	2.12	--	--	--	5.10	7.86	3.03	--	5.07	--	8.99
Range	57.5-60.5	81.0	--	--	50.0-69.0	57.5-88.0	73.0-80.5	--	60.0-77.0	--	50.0-88.0
Totals,											
N	2	1	--	--	25	104	16	4	14	1	176
Mean	59.00	81.0	--	--	59.26	71.31	75.16	56.00	71.32	75.5	69.66
STD	2.12	--	--	--	4.50	5.85	5.00	2.45	4.91	--	7.49
Range	57.5-60.5	81.0	--	--	50.0-69.0	57.5-88.0	63.0-83.0	53.0-59.0	60.0-77.5	75.5	50.0-88.0
Subbasin hatchery,											
Foster,											
Females,											
N	20	243	35	--	1	--	--	--	--	--	304
Mean	55.08	68.87	77.34	--	55.5	--	--	--	--	--	68.94
STD	2.05	3.13	2.98	--	--	--	--	--	--	--	5.60
Range	52.0-59.5	59.5-78.0	68.5-82.0	--	55.5	--	--	--	--	--	52.0-82.0
Males,											
N	12	97	37	1	2	--	--	--	--	--	156
Mean	59.08	70.35	82.04	92.5	63.25	--	--	--	--	--	72.75
STD	3.58	5.13	3.44	--	6.72	--	--	--	--	--	8.16
Range	53.5-65.0	57.0-84.0	75.5-88.5	92.5	58.5-68.0	--	--	--	--	--	53.5-92.5
Totals,											
N	32	340	72	1	3	--	--	--	--	--	460
Mean	56.58	69.29	79.76	92.5	60.67	--	--	--	--	--	70.23
STD	3.32	3.86	3.98	--	6.53	--	--	--	--	--	6.81
Range	52.0-65.0	57.0-84.0	68.5-88.5	92.5	55.5-68.0	--	--	--	--	--	52.0-92.5

[a] Mean estimates include steelhead with spawning checks and steelhead in which the origin, but not the age of the fish could be determined from the scale sample.

Table 37. Mean fork length (cm) of adult summer steelhead without spawning checks; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 2000-2001 run year of summer steelhead escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop., statistic	Freshwater/Ocean age										Sample[a]
	1/1	1/2	1/3	2/1	2/2	2/3	3/1	3/2	3/3	4/2	mean
Wild,											
Hood River,											
Females,											
N	--	4	--	14	70	2	5	46	1	1	153
Mean	--	67.38	--	56.07	69.44	76.25	57.80	68.97	75.0	75.0	68.11
STD	--	7.06	--	6.03	5.81	5.30	10.71	3.97	--	--	7.26
Range	--	58.5-74.0	--	38.5-63.0	55.0-82.5	72.5-80.0	43.5-73.5	55.5-75.5	75.0	75.0	38.5-86.0
Males,											
N	--	--	2	6	25	4	--	5	1	--	48
Mean	--	--	62.25	58.83	71.42	83.62	--	73.50	84.0	--	71.25
STD	--	--	26.52	3.46	8.56	1.49	--	4.21	--	--	10.42
Range	--	--	43.5-81.0	54.5-62.5	51.0-86.0	82.0-85.5	--	69.5-78.0	84.0	--	43.5-87.5
Totals,											
N	--	4	2	20	95	6	5	51	2	1	201
Mean	--	67.38	62.25	56.90	69.96	81.17	57.80	69.41	79.50	75.0	68.86
STD	--	7.06	26.52	5.45	6.65	4.63	10.71	4.18	6.36	--	8.21
Range	--	58.5-74.0	43.5-81.0	38.5-63.0	51.0-86.0	72.5-85.5	43.5-73.5	55.5-78.0	75.0-84.0	75.0	38.5-87.5
Subbasin hatchery,											
Foster,											
Females,											
N	21	714	17	--	1	--	--	--	--	--	761
Mean	54.74	68.20	74.12	--	67.5	--	--	--	--	--	67.97
STD	4.29	3.58	10.06	--	--	--	--	--	--	--	4.56
Range	49.0-67.5	52.0-78.0	41.0-85.0	--	67.5	--	--	--	--	--	41.0-85.0
Males,											
N	10	341	31	--	1	--	--	--	--	--	388
Mean	54.80	70.89	80.34	--	63.0	--	--	--	--	--	71.22
STD	2.10	3.84	5.16	--	--	--	--	--	--	--	5.40
Range	52.0-57.0	56.0-82.5	71.0-92.0	--	63.0	--	--	--	--	--	52.0-92.0
Totals,											
N	31	1,055	48	--	2	--	--	--	--	--	1,149
Mean	54.76	69.07	78.14	--	65.25	--	--	--	--	--	69.07
STD	3.69	3.88	7.78	--	3.18	--	--	--	--	--	5.09
Range	49.0-67.5	52.0-82.5	41.0-92.0	--	63.0-67.5	--	--	--	--	--	41.0-92.0

Table 37. Continued.

Origin, stock, sample pop., statistic	Freshwater/Ocean age 1/1	1/2	1/3	2/1	2/2	2/3	3/1	3/2	3/3	4/2	Sample[a] mean
Subbasin hatchery, (cont.)											
Hood River,											
Females,											
N	2	--	--	--	--	--	--	--	--	--	2
Mean	58.00	--	--	--	--	--	--	--	--	--	58.00
STD	5.66	--	--	--	--	--	--	--	--	--	5.66
Range	54.0-62.0	--	--	--	--	--	--	--	--	--	54.0-62.0
Males,											
N	5	--	--	--	--	--	--	--	--	--	5
Mean	57.30	--	--	--	--	--	--	--	--	--	57.30
STD	2.25	--	--	--	--	--	--	--	--	--	2.25
Range	54.5-60.0	--	--	--	--	--	--	--	--	--	54.5-60.0
Totals,											
N	7	--	--	--	--	--	--	--	--	--	7
Mean	57.50	--	--	--	--	--	--	--	--	--	57.50
STD	2.97	--	--	--	--	--	--	--	--	--	2.97
Range	54.0-62.0	--	--	--	--	--	--	--	--	--	54.0-62.0

[a] Mean estimates include steelhead with spawning checks and steelhead in which the origin, but not the age of the fish could be determined from the scale sample.

Table 38. Mean fork length (cm) of adult summer steelhead without spawning checks; by origin, stock, brood year, and age category. [Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables and in Olsen et al. (1994), Olsen et al. (1995), Olsen et al. (1996), Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).]

Origin, stock, brood year	Freshwater/Ocean age											
	1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4
Wild,												
Hood River,												
1986	--	--	--	--	--	--	64 (1)	--	--	--	--	--
1987	--	--	--	--	--	68 (76)	--	--	82 (46)	79 (7)	--	79 (3)
1988	--	--	54 (6)	--	70 (300)	66 (41)	--	--	80 (46)	79 (9)	--	--
1989	--	57 (25)	53 (5)	69 (5)	68 (99)	70 (55)	--	88 (2)	80 (23)	81 (1)	--	--
1990	--	55 (10)	54 (1)	70 (1)	69 (71)	68 (9)	--	--	80 (17)	81 (2)	--	--
1991	--	51 (4)	57 (2)	--	68 (76)	68 (19)	--	--	78 (13)	--	--	--
1992	--	60 (14)	56 (2)	--	72 (120)	73 (9)	--	--	77 (6)	--	--	--
1993	--	53 (6)	55 (1)	72 (2)	71 (36)	70 (14)	--	--	73 (12)	76 (1)	--	--
1994	--	56 (6)	--	65 (1)	72 (67)	71 (14)	75 (1)	--	75 (16)	80 (2)	--	--
1995	--	56 (13)	56 (4)	55 (2)	71 (104)	69 (51)	--	--	81 (6)	--	--	--
1996	--	59 (25)	58 (5)	81 (1)	70 (95)	--	--	62 (2)	--	--	--	--
1997	59 (2)	57 (20)	--	67 (4)	--	--	--	--	--	--	--	--
Subbasin hatchery,												
Foster,												
1987	--	--	--	--	--	--	--	--	--	--	90 (1)	--
1988	--	--	--	--	--	--	--	78 (143)	--	--	79 (3)	--
1989	--	--	--	68 (1,466)	--	--	--	80 (229)	--	--	--	--
1990	55 (47)	--	--	67 (795)	75 (1)	--	--	79 (239)	--	--	--	--
1991	53 (35)	--	--	69 (1,304)	66 (1)	--	--	81 (55)	--	--	--	--
1992	53 (11)	--	--	68 (390)	69 (6)	--	--	80 (76)	--	--	--	--
1993	57 (57)	--	--	69 (1,199)	--	--	--	78 (35)	--	--	--	--
1994	53 (7)	--	--	69 (515)	--	--	--	78 (127)	--	--	92 (1)	--
1995	58 (9)	--	--	68 (356)	--	--	--	80 (72)	--	--	--	--
1996	56 (24)	61 (3)	--	69 (340)	65 (2)	--	--	78 (48)	--	--	--	--
1997	57 (32)	--	--	69 (1,055)	--	--	--	--	--	--	--	--
1998	55 (31)	--	--	--	--	--	--	--	--	--	--	--

Table 38. Continued.

Origin, stock, brood year	Freshwater/Ocean age											
	1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4
Subbasin hatchery, (cont.)												
Hood River,												
1998	58 (7)	--	--	--	--	--	--	--	--	--	--	--

Table 39. Mean weight (kg) of adult summer steelhead without spawning checks; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 1999-2000 run year of summer steelhead escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop., statistic	Freshwater/Ocean age										Sample[a]
	1/1	1/2	1/3	1/4	2/1	2/2	2/3	3/1	3/2	3/3	mean
Wild,											
Hood River,											
Females,											
N	--	--	--	--	11	64	11	4	4	1	104
Mean	--	--	--	--	2.36	3.59	4.27	1.88	4.18	4.1	3.52
STD	--	--	--	--	0.46	0.69	0.98	0.19	0.62	--	0.90
Range	--	--	--	--	1.7-3.0	1.9-5.3	2.6-6.0	1.6-2.0	3.5-4.7	4.1	1.6-6.0
Males,											
N	2	1	--	--	12	36	5	--	10	--	66
Mean	1.85	5.3	--	--	1.98	3.82	4.46	--	3.33	--	3.42
STD	0.07	--	--	--	0.70	1.27	0.59	--	0.74	--	1.32
Range	1.8-1.9	5.3	--	--	1.2-3.6	1.7-6.8	3.6-5.2	--	2.3-4.8	--	1.2-6.8
Totals,											
N	2	1	--	--	23	100	16	4	14	1	170
Mean	1.85	5.3	--	--	2.17	3.68	4.33	1.88	3.57	4.1	3.49
STD	0.07	--	--	--	0.62	0.94	0.86	0.19	0.79	--	1.08
Range	1.8-1.9	5.3	--	--	1.2-3.6	1.7-6.8	2.6-6.0	1.6-2.0	2.3-4.8	4.1	1.2-6.8
Subbasin hatchery,											
Foster,											
Females,											
N	18	241	35	--	1	--	--	--	--	--	300
Mean	1.68	3.21	4.61	--	1.6	--	--	--	--	--	3.28
STD	0.20	0.49	0.60	--	--	--	--	--	--	--	0.79
Range	1.3-2.0	2.1-4.8	3.2-5.7	--	1.6	--	--	--	--	--	1.3-5.7
Males,											
N	12	96	37	1	2	--	--	--	--	--	154
Mean	1.98	3.44	5.45	8.0	1.90	--	--	--	--	--	3.87
STD	0.41	0.74	0.64	--	0.14	--	--	--	--	--	1.30
Range	1.5-3.0	2.0-5.1	3.9-6.8	8.0	1.8-2.0	--	--	--	--	--	1.5-8.0
Totals,											
N	30	337	72	1	3	--	--	--	--	--	454
Mean	1.80	3.28	5.04	8.0	1.80	--	--	--	--	--	3.48
STD	0.33	0.58	0.75	--	0.20	--	--	--	--	--	1.03
Range	1.3-3.0	2.0-5.1	3.2-6.8	8.0	1.6-2.0	--	--	--	--	--	1.3-8.0

[a] Mean estimates include steelhead with spawning checks and steelhead in which the origin, but not the age of the fish could be determined from the scale sample.

Table 40. Mean weight (kg) of adult summer steelhead without spawning checks; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 2000-2001 run year of summer steelhead escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop., statistic	Freshwater/Ocean age										Sample[a]
	1/1	1/2	1/3	2/1	2/2	2/3	3/1	3/2	3/3	4/2	mean
Wild,											
Hood River,											
Females,											
N	--	4	--	14	70	2	5	47	1	1	154
Mean	--	3.28	--	1.90	3.51	4.95	2.32	3.32	4.2	4.2	3.33
STD	--	0.88	--	0.48	0.86	1.20	1.46	0.57	--	--	0.96
Range	--	2.1-4.0	--	0.7-2.5	1.8-6.1	4.1-5.8	0.9-4.8	1.9-4.3	4.2	4.2	0.7-6.1
Males,											
N	--	--	2	6	25	4	--	5	1	--	48
Mean	--	--	3.05	2.12	3.64	5.48	--	4.08	5.7	--	3.71
STD	--	--	3.18	0.39	1.06	0.73	--	0.62	--	--	1.38
Range	--	--	0.8-5.3	1.5-2.5	1.5-5.7	4.8-6.5	--	3.5-4.9	5.7	--	0.8-6.7
Totals,											
N	--	4	2	20	95	6	5	52	2	1	202
Mean	--	3.28	3.05	1.96	3.54	5.30	2.32	3.39	4.95	4.2	3.42
STD	--	0.88	3.18	0.46	0.91	0.82	1.46	0.61	1.06	--	1.08
Range	--	2.1-4.0	0.8-5.3	0.7-2.5	1.5-6.1	4.1-6.5	0.9-4.8	1.9-4.9	4.2-5.7	4.2	0.7-6.7
Subbasin hatchery,											
Foster,											
Females,											
N	21	714	17	--	1	--	--	--	--	--	761
Mean	1.80	3.25	4.24	--	3.0	--	--	--	--	--	3.23
STD	0.49	0.51	1.29	--	--	--	--	--	--	--	0.62
Range	1.3-3.3	1.6-5.1	0.8-6.0	--	3.0	--	--	--	--	--	0.8-6.0
Males,											
N	10	342	31	--	1	--	--	--	--	--	389
Mean	1.74	3.57	5.09	--	2.6	--	--	--	--	--	3.65
STD	0.22	0.60	1.02	--	--	--	--	--	--	--	0.82
Range	1.4-2.1	2.0-5.5	3.7-7.6	--	2.6	--	--	--	--	--	1.4-7.6
Totals,											
N	31	1,056	48	--	2	--	--	--	--	--	1,150
Mean	1.78	3.36	4.79	--	2.80	--	--	--	--	--	3.37
STD	0.41	0.57	1.18	--	0.28	--	--	--	--	--	0.72
Range	1.3-3.3	1.6-5.5	0.8-7.6	--	2.6-3.0	--	--	--	--	--	0.8-7.6

Table 40. Continued.

Origin, stock, sample pop., statistic	Freshwater/Ocean age 1/1	1/2	1/3	2/1	2/2	2/3	3/1	3/2	3/3	4/2	Sample[a] mean
Subbasin hatchery, (cont.)											
Hood River,											
Females,											
N	2	--	--	--	--	--	--	--	--	--	2
Mean	2.05	--	--	--	--	--	--	--	--	--	2.05
STD	0.49	--	--	--	--	--	--	--	--	--	0.49
Range	1.7-2.4	--	--	--	--	--	--	--	--	--	1.7-2.4
Males,											
N	5	--	--	--	--	--	--	--	--	--	5
Mean	1.92	--	--	--	--	--	--	--	--	--	1.92
STD	0.20	--	--	--	--	--	--	--	--	--	0.20
Range	1.7-2.1	--	--	--	--	--	--	--	--	--	1.7-2.1
Totals,											
N	7	--	--	--	--	--	--	--	--	--	7
Mean	1.96	--	--	--	--	--	--	--	--	--	1.96
STD	0.27	--	--	--	--	--	--	--	--	--	0.27
Range	1.7-2.4	--	--	--	--	--	--	--	--	--	1.7-2.4

[a] Mean estimates include steelhead with spawning checks and steelhead in which the origin, but not the age of the fish could be determined from the scale sample.

Table 41. Mean weight (kg) of adult summer steelhead without spawning checks; by origin, stock, brood year, and age category. [Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables and in Olsen et al. (1996), Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).]

Origin, stock, brood year	Freshwater/Ocean age											
	1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4
Wild,												
Hood River,												
1988	--	--	--	--	--	--	--	--	--	5.3 (9)	--	--
1989	--	--	--	--	2.8 (3)	3.6 (54)	--	--	5.2 (23)	5.0 (1)	--	--
1990	--	1.7 (1)	--	--	3.4 (70)	3.4 (9)	--	--	5.1 (17)	5.4 (2)	--	--
1991	--	1.6 (3)	2.0 (2)	--	3.2 (75)	3.3 (19)	--	--	4.9 (13)	--	--	--
1992	--	2.3 (13)	1.8 (2)	--	3.8 (116)	3.7 (9)	--	--	4.6 (6)	--	--	--
1993	--	1.6 (6)	1.6 (1)	4.0 (2)	3.5 (36)	3.7 (13)	--	--	4.1 (12)	4.1 (1)	--	--
1994	--	1.9 (6)	--	2.5 (1)	3.8 (66)	3.6 (14)	4.2 (1)	--	4.3 (16)	5.0 (2)	--	--
1995	--	2.0 (13)	1.9 (4)	2.0 (2)	3.7 (100)	3.4 (52)	--	--	5.3 (6)	--	--	--
1996	--	2.2 (23)	2.3 (5)	5.3 (1)	3.5 (95)	--	--	3.0 (2)	--	--	--	--
1997	1.8 (2)	2.0 (20)	--	3.3 (4)	--	--	--	--	--	--	--	--
Subbasin hatchery,												
Foster,												
1990	--	--	--	--	4.1 (1)	--	--	5.1 (183)	--	--	--	--
1991	--	--	--	3.4 (1,065)	2.9 (1)	--	--	5.3 (51)	--	--	--	--
1992	1.6 (10)	--	--	3.2 (368)	2.9 (5)	--	--	4.9 (74)	--	--	--	--
1993	2.0 (54)	--	--	3.4 (1,140)	--	--	--	4.7 (34)	--	--	--	--
1994	1.8 (7)	--	--	3.3 (476)	--	--	--	4.7 (124)	--	--	8.0 (1)	--
1995	2.0 (9)	--	--	3.3 (349)	--	--	--	5.0 (72)	--	--	--	--
1996	1.8 (24)	1.8 (3)	--	3.3 (337)	2.8 (2)	--	--	4.8 (48)	--	--	--	--
1997	1.8 (30)	--	--	3.4 (1,056)	--	--	--	--	--	--	--	--
1998	1.8 (31)	--	--	--	--	--	--	--	--	--	--	--
Hood River,												
1998	2.0 (7)	--	--	--	--	--	--	--	--	--	--	--

Table 42. Adult summer steelhead sex ratios as a percentage of females; by origin, stock, run year, and age category. Fish were sampled at the Powerdale Dam trap. (Sample size is in parentheses.)

Origin, stock, run year	Freshwater/Ocean age												Repeat spawners
	1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	
Wild,													
Hood River,													
1992-1993	--	72 (25)	83 (6)	60 (5)	79 (300)	80 (76)	100 (1)	--	28 (46)	--	--	--	69 (16)
1993-1994	--	30 (10)	40 (5)	0 (1)	75 (99)	73 (41)	--	50 (2)	48 (46)	29 (7)	--	100 (3)	75 (8)
1994-1995	--	75 (4)	100 (1)	--	79 (71)	65 (55)	--	--	48 (23)	44 (9)	--	--	80 (10)
1995-1996	--	64 (14)	100 (2)	--	70 (76)	67 (9)	--	--	41 (17)	0 (1)	--	--	100 (1)
1996-1997	--	33 (6)	100 (2)	50 (2)	71 (120)	68 (19)	--	--	46 (13)	50 (2)	--	--	75 (4)
1997-1998	--	83 (6)	0 (1)	100 (1)	75 (36)	56 (9)	--	--	50 (6)	--	--	--	80 (5)
1998-1999	--	69 (13)	--	0 (2)	79 (67)	79 (14)	--	--	75 (12)	--	--	--	78 (9)
1999-2000	0 (2)	52 (25)	100 (4)	0 (1)	64 (104)	29 (14)	--	--	69 (16)	100 (1)	--	--	100 (9)
2000-2001	--	70 (20)	100 (5)	100 (4)	74 (95)	90 (52)	100 (1)	0 (2)	33 (6)	50 (2)	--	--	69 (13)
Subbasin hatchery,													
Foster,													
1992-1993	47 (47)	--	--	73 (1,466)	--	--	--	34 (143)	--	--	0 (1)	--	77 (13)
1993-1994	60 (35)	--	--	76 (795)	--	--	--	43 (229)	--	--	100 (3)	--	50 (6)
1994-1995	36 (11)	--	--	62 (1,303)	0 (1)	--	--	41 (239)	--	--	--	--	60 (10)
1995-1996	61 (57)	--	--	62 (390)	100 (1)	--	--	25 (55)	--	--	--	--	33 (6)
1996-1997	43 (7)	--	--	63 (1,188)	33 (6)	--	--	38 (76)	--	--	--	--	67 (6)
1997-1998	67 (9)	--	--	70 (515)	--	--	--	40 (35)	--	--	--	--	50 (4)
1998-1999	46 (24)	--	--	69 (356)	--	--	--	43 (127)	--	--	--	--	56 (16)
1999-2000	62 (32)	33 (3)	--	71 (340)	--	--	--	49 (72)	--	--	0 (1)	--	42 (12)
2000-2001	68 (31)	--	--	68 (1,056)	50 (2)	--	--	35 (48)	--	--	--	--	62 (13)
Hood River,													
2000-2001	29 (7)	--	--	--	--	--	--	--	--	--	--	--	--

Table 43. Mean fecundity[a] of adult summer steelhead; by origin, ocean age, and run year. Fish were sampled at the Powerdale Dam trap.

Origin, ocean age, run year	N	Mean fork length (cm)	Fecundity (eggs/female) Mean	Range	95% C.I.
Wild,					
1 Salt,					
1997-1998	1	65.0	5,010	5,010	--
1998-1999	1	60.0	3,510	3,510	--
1999-2000	0	--	--	--	--
2000-2001	1	56.5	3,807	3,807	--
2 Salt,					
1997-1998	2	69.0	4,322	4,212 - 4,432	± 1,398
1998-1999	7	68.4	3,806	3,180 - 4,986	± 579
1999-2000	7	69.6	3,931	2,700 - 5,535	± 823
2000-2001	9	69.7	5,413	3,384 - 7,950	± 1,158
3 Salt,					
1997-1998	2	77.5	4,828	4,488 - 5,168	± 4,320
1998-1999	3	74.8	4,254	3,952 - 4,760	± 1,095
1999-2000	6	72.8	4,144	3,168 - 5,616	± 862
4 Salt,					
2000-2001	1	84.0	5,819	5,819	--

[a] Estimates were based on numbers of eggs collected from air spawned fish and may under estimate true fecundity (*see* **Methods**).

Table 44. Bi-weekly counts of upstream migrant adult winter steelhead captured at the Powerdale Dam trap; by origin, stock, and run year. Counts are boldfaced for the bi-weekly period in which the median date of migration occurred in each origin category.

Origin, stock, run year	September		October		November		December		January		February		March		April		May		June		July		
	01-15	16-30	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-31	01-15	16-29	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-30	01-15	16-31	Total
Wild,																							
Hood River,																							
1991-1992	0	0	0	0	0	0	0	0	0	24	28	32	75	99	**153**	150	88	28	2	0	0	0	679
1992-1993	0	0	0	0	0	0	0	4	0	2	3	0	28	61	99	**79**	86	30	3	2	0	0	397
1993-1994	0	0	0	0	0	0	0	0	4	7	0	6	23	25	77	**128**	76	21	11	0	0	0	378
1994-1995	0	0	0	0	0	0	0	0	0	0	9	0	6	2	55	15	**52**	44	10	1	0	0	194
1995-1996	0	0	0	0	0	0	0	0	0	0	0	0	17	4	93	**40**	69	36	11	0	0	0	270
1996-1997	0	0	1	0	0	0	0	2	1	0	3	13	5	22	52	**72**	68	33	3	0	0	0	275
1997-1998	0	0	0	0	1	0	0	0	1	1	6	0	7	12	23	**107**	36	8	6	1	0	0	209
1998-1999	0	0	0	0	0	0	0	0	12	0	4	2	8	32	47	**121**	22	33	7	2	0	0	290
1999-2000	0	0	0	0	0	0	7	1	0	2	15	16	69	111	**320**	225	115	26	1	0	0	0	908
2000-2001	0	0	0	0	0	0	0	0	0	0	1	7	50	143	**314**	381	86	19	0	1	0	0	1,002
Subbasin hatchery,																							
Big Creek,																							
1991-1992	0	0	0	0	0	0	0	5	11	94	**54**	43	30	6	2	2	0	0	0	0	0	0	247
1992-1993	0	0	0	0	0	0	2	13	0	31	44	0	**39**	31	13	12	2	0	0	0	0	0	187
1993-1994	0	0	0	0	0	0	0	0	23	30	7	**35**	31	4	0	0	0	0	0	0	0	0	130
1994-1995	0	0	0	0	0	0	0	0	0	0	**5**	1	3	0	0	0	0	0	0	0	0	0	9
Mixed,[a]																							
1992-1993	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**4**	1	1	0	0	0	0	0	6
1993-1994	0	0	0	0	0	0	0	0	2	1	1	1	1	**2**	3	2	0	0	0	0	0	0	13
1994-1995	0	0	0	0	0	0	0	0	0	0	**4**	0	0	0	1	0	3	0	0	0	0	0	8
Hood River,																							
1993-1994	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	1
1994-1995	0	0	0	0	0	0	0	0	0	6	19	**17**	8	4	21	3	4	1	0	0	0	0	83
1995-1996	0	0	0	0	0	2	0	0	0	0	0	0	19	8	93	**47**	66	21	3	0	0	0	259
1996-1997	0	0	0	0	0	0	0	0	0	1	2	38	20	54	128	**171**	140	51	8	0	0	0	613
1997-1998	0	0	0	0	5	1	0	0	1	0	6	5	26	55	**85**	146	27	5	1	0	0	0	363
1998-1999	0	1	3	6	3	5	0	0	10	0	4	0	6	65	**75**	87	12	23	1	2	0	0	303
1999-2000	0	0	0	1	5	1	1	0	2	1	12	13	35	45	**83**	53	28	10	0	0	0	0	290

Table 44. Continued.

Origin, stock, run year	September 01-15	September 16-30	October 01-15	October 16-31	November 01-15	November 16-30	December 01-15	December 16-31	January 01-15	January 16-31	February 01-15	February 16-29	March 01-15	March 16-31	April 01-15	April 16-30	May 01-15	May 16-31	June 01-15	June 16-30	July 01-15	July 16-31	Total
Subbasin hatchery,																							
Hood River, (cont.)																							
2000-2001	0	0	0	0	0	0	0	0	2	0	2	10	71	224	**308**	217	51	11	1	0	0	0	897
Stray hatchery,																							
Unknown,																							
1991-1992	0	0	0	0	0	0	0	0	0	2	2	1	5	**4**	7	1	0	0	0	0	0	0	22
1992-1993	0	0	0	0	0	0	0	0	0	1	2	0	2	**9**	7	1	0	0	0	0	0	0	22
1993-1994	0	0	0	0	0	0	0	0	1	0	0	0	1	1	**11**	6	0	0	0	0	0	0	20
1994-1995	0	0	0	0	0	0	0	0	0	0	0	1	**1**	1	0	0	0	0	0	0	0	0	3
1995-1996	0	0	0	0	0	0	0	0	0	0	0	0	**3**	1	2	0	0	0	0	0	0	0	6
1996-1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	1	0	2
1997-1998	0	0	0	0	0	0	0	0	0	0	1	0	0	**1**	0	0	1	0	0	0	0	0	3
1998-1999	0	0	0	0	0	0	0	0	1	0	0	0	0	2	**1**	3	0	0	0	0	0	0	7
1999-2000	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	1
2000-2001	0	0	0	0	0	0	0	0	0	0	0	3	3	**15**	7	8	2	0	0	0	0	0	38
Unknown,																							
Unknown,																							
1991-1992	0	0	0	0	0	0	0	0	4	22	9	**7**	6	5	3	9	4	2	0	0	0	0	71
1992-1993	0	0	0	0	0	0	1	4	0	7	7	0	**6**	5	4	2	3	0	0	0	0	0	39
1993-1994	0	0	0	0	0	0	0	0	6	3	0	1	6	**8**	5	5	3	2	0	0	0	0	39
1994-1995	0	0	0	0	0	0	0	1	0	0	5	3	0	0	**4**	1	2	2	2	0	0	0	20
1995-1996	0	0	0	0	0	0	0	0	0	0	0	0	2	1	9	**5**	5	3	0	0	0	0	25
1996-1997	0	0	0	0	0	0	0	0	0	0	0	5	1	6	**8**	8	7	4	1	0	0	0	40
1997-1998	0	0	0	0	0	0	0	0	0	0	0	4	9	5	**11**	11	5	1	0	0	0	0	46
1998-1999	0	0	1	0	0	0	0	0	1	1	0	0	1	2	**7**	7	1	2	0	0	0	0	23
1999-2000	0	0	0	0	0	1	0	0	0	0	0	3	0	2	**10**	5	6	0	0	0	0	0	27
2000-2001	0	0	0	0	0	0	0	0	0	0	0	0	4	6	**15**	9	1	0	0	0	0	0	35

[a] Returns from the 1991 brood are progeny of wild x Big Creek stock hatchery crosses.

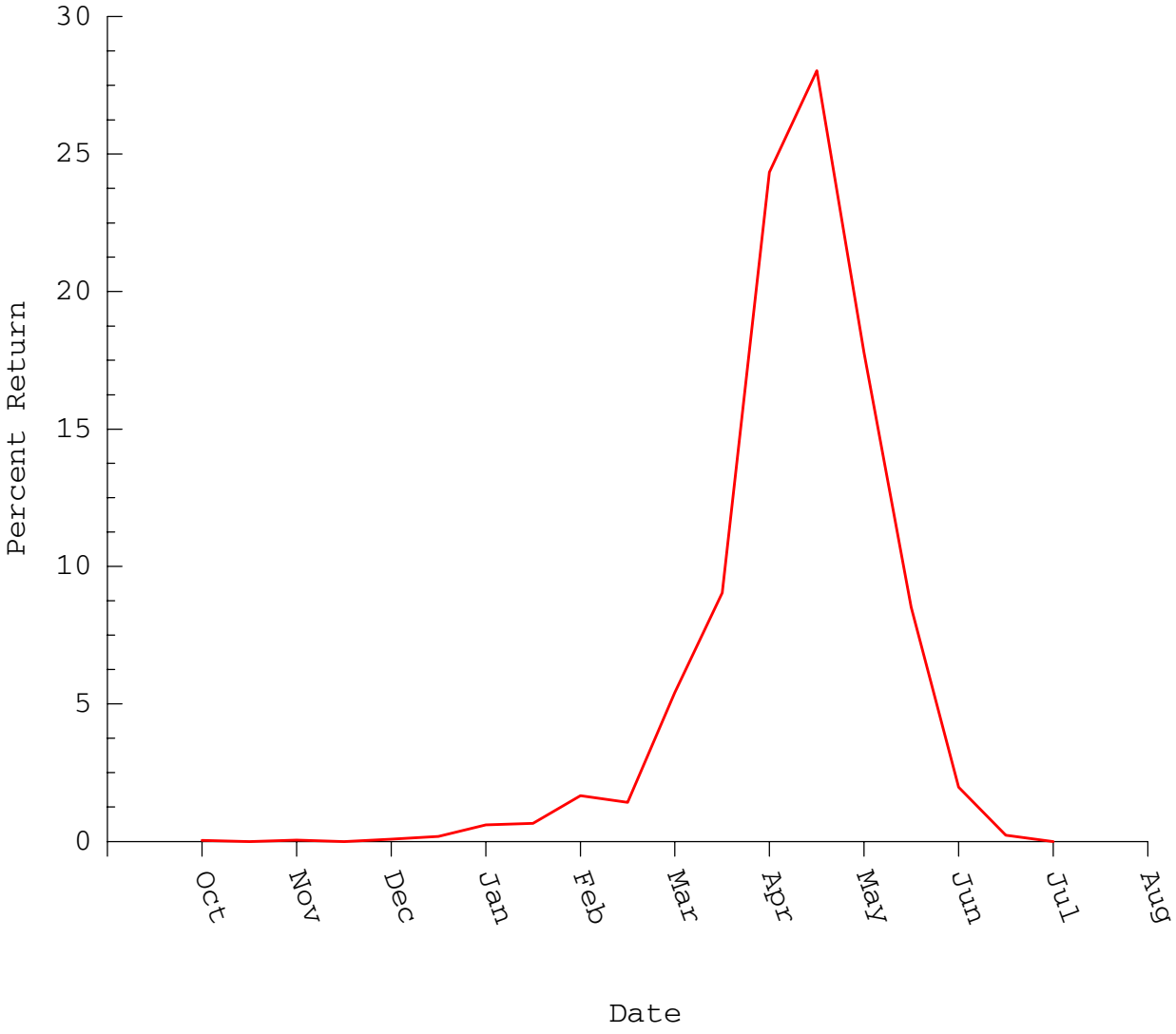

Figure 11. Bi-weekly returns of wild adult winter steelhead as a percentage of the total run. Estimates are an average of the run year specific percentages for the 1991-1992 through 2000-2001 run years escaping to the Powerdale Dam trap.

Table 45. Estimated harvest of adult winter steelhead in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 1999. Confidence limits (95%) are in parenthesis. Run year specific estimates are presented in **Appendix F**.

	Wild winter steelhead		Subbasin hatchery winter steelhead		Catch Rate
Period	Kept	Released[a]	Kept	Released	(hrs/fish)
Jan 1-15	--	9 (7.0)	11 (6.7)	7 (6.4)	35
Jan 16-31	--	9 (7.1)	11 (9.3)	8 (6.6)	29
Feb 1-15	--	21 (13.9)	15 (10.1)	11 (10.5)	16
Feb 16-28	--	24 (16.4)	29 (15.6)	10 (8.4)	13
Mar 1-15	--	59 (25.9)	23 (12.6)	2 (2.5)	14
Mar 16-31	--	41 (28.1)	20 (17.3)	34 (22.1)	15
Apr 1-15	--	31 (16.9)	6 (5.8)	13 (9.7)	17
Apr 16-30	--	20 (14.8)	25 (19.9)	4 (6.8)	27
May 1-15	--	17 (13.5)	5 (5.4)	20 (19.7)	30
May 16-31	--	7 (7.1)	--	--	160
Jun 1-15	--	--	--	--	--
Jun 16-30	--	--	--	--	--
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Aug 1-15	--	--	--	--	--
Aug 16-31	--	--	--	--	--
Sep 1-15	--	--	--	--	--
Sep 16-30	--	--	--	--	--
Oct 1-15	--	--	--	--	--
Oct 16-31	--	--	--	--	--
Nov 1-15	--	--	--	--	--
Nov 16-30	--	--	2 (3.3)	--	104
Dec 1-15	--	5 (7.5)	1 (2.8)	--	61
Dec 16-31	--	3 (3.7)	3 (4.6)	--	147
Total	0	246 (53)	151 (38)	109 (36)	24[b]

[a] Estimate may include wild summer steelhead.

[b] Estimate of mean catch rate is for the period 1 January - 31 May and 16 November - 31 December.

Table 46. Estimated harvest of adult winter steelhead in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2000. Confidence limits (95%) are in parenthesis. Run year specific estimates are presented in **Appendix F.**

Period	Wild winter steelhead		Subbasin hatchery winter steelhead		Catch Rate
	Kept	Released[a]	Kept	Released	(hrs/fish)
Jan 1-15	--	18 (11.5)	15 (9.9)	2 (3.7)	17
Jan 16-31	--	34 (19.2)	22 (16.1)	7 (6.7)	16
Feb 1-15	--	35 (17.9)	24 (18.0)	--	18
Feb 16-29	--	52 (18.1)	14 (9.7)	3 (5.3)	15
Mar 1-15	--	53 (31.7)	29 (17.5)	2 (3.7)	14
Mar 16-31	--	86 (32.6)	38 (22.7)	4 (4.0)	14
Apr 1-15	--	38 (16.6)	24 (14.5)	2 (3.1)	24
Apr 16-30	--	15 (13.9)	42 (24.4)	--	30
May 1-15	3 (5.0)	--	--	2 (4.0)	479
May 16-31	--	1 (1.8)	--	--	1,647
Jun 1-15	--	--	--	--	--
Jun 16-30	--	--	--	--	--
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Aug 1-15	--	--	--	--	--
Aug 16-31	--	--	--	--	--
Sep 1-15	--	--	--	--	--
Sep 16-30	--	--	--	--	--
Oct 1-15[b]	--	--	--	--	--
Oct 16-31[b]	--	--	--	--	--
Nov 1-15[b]	--	--	--	--	--
Nov 16-30[b]	--	--	--	--	--
Dec 1-15[b]	--	--	--	--	--
Dec 16-31	--	--	--	--	--
Total	3 (5.0)	332 (61)	208 (49)	22 (12)	25[c]

[a] Estimate may include wild summer steelhead and maxillary clipped (i.e., left or right maxillary clipped) hatchery summer steelhead mis-identified by the fisher as a wild steelhead.

[b] The Hood River subbasin was virtually un-fishable below Powerdale Dam due to heavy sediment load resulting from the Newton Creek glacial blowout on 29 September, 2000.

[c] Estimate of mean catch rate is for the period 1 January - 31 May.

Table 47. Estimated harvest of adult winter steelhead in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2001. Confidence limits (95%) are in parenthesis. Run year specific estimates are presented in **Appendix F.**

	Wild winter steelhead		Subbasin hatchery winter steelhead		Catch Rate
Period	Kept	Released[a]	Kept	Released	(hrs/fish)
Jan 1-15	--	--	--	--	--
Jan 16-31	--	2 (4.4)	4 (6.0)	--	56
Feb 1-15	--	5 (2.1)	--	--	51
Feb 16-28	--	9 (10.5)	9 (10.3)	1 (1.6)	41
Mar 1-15	--	12 (12.6)	19 (13.2)	5 (7.3)	18
Mar 16-31	--	130 (106)	70 (63.7)	5 (7.4)	6
Apr 1-15	--	105 (66.7)	205 (121)	45 (36.1)	6
Apr 16-30	--	36 (23.2)	35 (18.5)	2 (4.0)	21
May 1-15	--	27 (27.0)	9 (12.4)	3 (4.8)	29
May 16-31	--	--	--	--	--
Jun 1-15	--	3 (5.0)	--	--	602
Jun 16-30	--	--	--	--	--
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Aug 1-15	--	--	--	--	--
Aug 16-31	--	--	--	--	--
Sep 1-15	--	--	--	--	--
Sep 16-30	--	--	--	--	--
Oct 1-15	--	--	--	--	--
Oct 16-31	--	--	--	--	--
Nov 1-15	--	13 (11.2)	--	--	28
Nov 16-30	--	4 (5.9)	7 (10.6)	8 (9.2)	34
Dec 1-15	--	48 (33.5)	40 (25.2)	--	14
Dec 16-31	5 (8.3)	156 (57.0)	97 (45.0)	12 (11.7)	8
Total	5 (8.3)	550 (147)	495 (149)	81 (41)	14[b]

[a] Estimate may include wild summer steelhead and maxillary clipped (i.e., left or right maxillary clipped) hatchery summer steelhead mis-identified by the fisher as a wild steelhead.

[b] Estimate of mean catch rate is for the period 1 January - 15 June and 1 November through 31 December.

Table 48. Adult winter steelhead escapements to the Powerdale Dam trap; by origin, stock, run year, and age category. Fish of unknown origin were allocated to origin categories based on scale analysis and the ratio of fish of known origin (*see* **METHODS**).

Origin, stock, run year	Total escapement	Freshwater/Ocean age													Repeat spawner
		1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	3/4	
Wild,															
Hood River,															
1991-1992	699	--	9	1	3	424	111	1	4	77	17	0	0	0	52
1992-1993	413	--	37	1	2	174	20	0	6	123	17	0	1	0	32
1993-1994	405	--	9	1	2	274	17	0	6	79	4	0	0	0	13
1994-1995	206	--	28	3	1	107	9	0	1	34	3	0	1	1	18
1995-1996	280	--	18	1	12	183	22	0	1	29	6	1	0	0	7
1996-1997	291	--	12	3	1	199	25	1	1	35	7	0	0	0	7
1997-1998	228	--	13	3	1	134	20	0	0	42	4	0	0	0	11
1998-1999	300	--	55	2	8	155	23	0	0	38	11	0	0	0	8
1999-2000	926	--	6	1	4	793	41	0	1	45	2	0	1	0	32
2000-2001	1,017	--	21	16	3	587	111	1	1	128	13	0	1	0	135
Subbasin hatchery,															
Big Creek,															
1991-1992	298	--	--	--	281	5	--	--	6	1	--	0	--	--	5
1992-1993	210	--	--	--	63	0	--	--	138	0	--	0	--	--	9
1993-1994	137	--	--	--	--	66	--	--	65	0	--	1	--	--	5
1994-1995	10	--	--	--	--	--	--	--	--	7	--	0	--	--	3
Mixed,[a]															
1992-1993	6	6	--	--	--	--	--	--	--	--	--	--	--	--	--
1993-1994	14	--	--	--	14	--	--	--	--	--	--	--	--	--	--
1994-1995	8	--	--	--	--	6	--	--	2	--	--	--	--	--	--
Hood River,															
1993-1994[b]	1	1	--	--	--	--	--	--	--	--	--	--	--	--	--
1994-1995	90	12	0	--	77	--	--	--	--	--	--	--	--	--	1
1995-1996	274	10	0	--	247	0	--	--	17	--	--	--	--	--	0

Table 48. Continued.

Origin, stock, run year	Total escapement	Freshwater/Ocean age													Repeat spawner
		1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	3/4	
Subbasin hatchery,															
Hood River, (cont.)															
1996-1997	636	7	0	--	523	4	--	--	98	0	--	0	--	--	4
1997-1998	390	3	1	--	242	3	--	--	128	1	--	0	0	--	12
1998-1999	316	12	0	--	156	18	--	--	118	0	--	1	0	--	11
1999-2000	299	6	0	--	214	11	--	--	47	5	--	1	0	--	15
2000-2001	917	9	2	--	704	6	--	--	159	0	--	0	1	--	36
Stray hatchery,															
Unknown,															
1991-1992	22	--	0	--	8	0	--	--	13	0	--	0	--	--	1
1992-1993	22	--	0	--	15	0	--	--	5	0	--	0	--	--	2
1993-1994	24	--	0	--	2	1	--	--	21	0	--	0	--	--	0
1994-1995	3	--	0	--	1	0	--	--	2	0	--	0	--	--	0
1995-1996	6	--	0	--	5	0	--	--	0	0	--	0	--	--	1
1996-1997	3	--	0	--	3	0	--	--	0	0	--	0	--	--	0
1997-1998	3	--	0	--	2	1	--	--	0	0	--	0	--	--	0
1998-1999	7	--	0	--	3	0	--	--	4	0	--	0	--	--	0
1999-2000	1	--	0	--	0	0	--	--	0	0	--	1	--	--	0
2000-2001	38	--	1	--	16	9	--	--	10	1	--	0	--	--	1

[a] Returns from the 1991 brood are progeny of wild x Big Creek stock hatchery crosses.

[b] The 1993-1994 run year is the first run year in which the Hood River stock (1992 brood) returned as adults to Powerdale Dam.

Table 49. Disposition of adult winter steelhead returning for the first time to the Powerdale Dam trap. Counts of wild and hatchery[a] adult steelhead may include marked and unmarked winter steelhead, respectively. Origin was determined based on scale analysis (see METHODS).

	Returns to Powerdale Dam		Broodstock collection[b]				Numbers passed above Powerdale Dam		Numbers recycled below Powerdale Dam		Mortalities		Transfers[c]	
			By origin		By sex									
Run year	Wild	Hatchery	Wild	Hatchery	Males	Females	Wild	Hatchery	Wild	Hatchery[d]	Wild	Hatchery[e]	Wild	Hatchery
1991-1992	699	320	70(3)	35	50(1)	55(2)	620	284	--	--	9	1	--	--
1992-1993	413	238	57(4)	1	30(2)	28(2)	344	11	3	223	9	3	--	--
1993-1994	405	176	78(3)	1(1)	34(1)	45(3)	301	5	13	167(1)	13	3	--	--
1994-1995	206	111	42	1	23	20	161	5	2	98(1)	1	7	--	--
1995-1996	280	280	65(6)	24(1)	46(5)	43(2)	211	161	1	88(1)	3	7	--	--
1996-1997	291	639	46(9)	37(6)	42(10)	41(5)	239	252	3	308(6)	3	42	--	--
1997-1998	228	393	39(9)	41(13)	34(9)	46(13)	183	162	4	163(21)	2	27	--	--
1998-1999	300	323	41(1)	35	33	43(1)	257	187	1	82(3)	1	19	--	--
1999-2000	926	300	47	47(1)	40	54(1)	870	222	5	21(1)	4	10	--	--
2000-2001	1,017	955	130	4	69	65	879	659	5	287	3	5	--	--

[a] Subbasin hatchery winter steelhead returning in the 1991-1992 run year were entirely from the Big Creek stock of hatchery winter steelhead. Subbasin hatchery winter steelhead returning in the 1992-1993 through 1994-1995 were from either the Big Creek, Mixed (*see* **ADULT WINTER STEELHEAD**), or Hood River stocks of hatchery winter steelhead. Subbasin hatchery winter steelhead returning in the 1995-1996 run year, and in all subsequent run years, were entirely from the Hood River stock of hatchery winter steelhead.

[b] Pre-spawning mortalities are included in the totals and listed in parenthesis.

[c] Adults were transferred to Kingsley Reservoir upon first return to Powerdale Dam.

[d] Recycled fish returning more than three times to Powerdale Dam may be killed (i.e., depending on the condition of the fish) or transferred to Kingsley Reservoir. The total number of adults falling into either of these two categories are summarized in parenthesis and included in the total number of recycled fish.

[e] Numbers include adult winter steelhead sacrificed for coded wire tags.

Table 50. Number of adult winter steelhead captured at the Powerdale Dam trap and transported for release (recycled) at the mouth of the Hood River. Number of recaptures (N) and percent return (%) are given for each successive recapture at the Powerdale Dam trap. Percent return is estimated after mortalities, adults taken for brood stock, fish with lost tags, and recycled fish subsequently passed above Powerdale Dam have been subtracted from the previous recapture count.

		Number of successive returns to the Powerdale Dam trap of recycled adult winter steelhead[a]													
	Total no.	1		2		3		4		5		6		7	
Run year	of recycles[b]	N	%	N	%	N	%	N	%	N	%	N	%	N	%
1992-1993	226	57	25	13	24	--	--	--	--	--	--	--	--	--	--
1993-1994	180	64	36	13	21	3	23	--	--	--	--	--	--	--	--
1994-1995	100	25	25	6	26	3	50	--	--	--	--	--	--	--	--
1995-1996	89	23	26	7	35	2	29	--	--	--	--	--	--	--	--
1996-1997	311	112	36	29	27	5	19	2	67	2	100	1	50	--	--
1997-1998	167	89	53	45	60	19	49	6	38	--	--	--	--	--	--
1998-1999	83	38	46	15	43	5	33	--	--	--	--	--	--	--	--
1999-2000	26	11	42	4	40	2	50	1	50	--	--	--	--	--	--
2000-2001	292	168	58	93	55	43	46	23	53	8	35	3	38	1	33

[a] Numbers do not include recycled adults that were recaptured untagged, or untagged recycles that were re-tagged and subsequently recaptured one or more times at the Powerdale Dam trap.

[b] Numbers do not include adults inadvertently recycled untagged, or adults that were classified as first time returning fish but had what appeared to be a tag hole (i.e., lost tag).

Table 51. Average number of days to return to the Powerdale Dam trap of adult winter steelhead captured at the Powerdale Dam trap and transported for release (recycled) at the mouth of the Hood River.

Run year	Total no. of recycles	Number of successive returns to the Powerdale Dam trap of recycled adult winter steelhead						
		1	2	3	4	5	6	7
1992-1993	226	17	10	--	--	--	--	--
1993-1994	180	15	10	6	--	--	--	--
1994-1995	100	11	6	10	--	--	--	--
1995-1996	89	13	8	4	--	--	--	--
1996-1997	311	14	10	6	4	4	2	--
1997-1998	167	13	7	7	6	--	--	--
1998-1999	83	12	11	16	--	--	--	--
1999-2000	26	13	7	8	7	--	--	--
2000-2001	292	10	9	7	5	7	7	2

Table 52. Adult winter steelhead escapements to the Powerdale Dam trap; by origin, stock, brood year, and ocean age category. (Percent smolt to adult return is in parentheses. Brood years are bold faced for those years in which brood year specific estimates of escapement are complete. Estimates are based on returns in the 1991-1992 through 2000-2001 run years.)

Origin, stock, brood year[a]	Smolts	Ocean age				Repeat spawners
		1 salt	2 salt	3 salt	4 salt	
Wild,						
Hood River,						
1985	--	--	--	--	--	2
1986	--	--	1	17	0	19
1987	--	--	111	94	1	39
1988	--	1	444	131	1	23
1989	--	10	194	88	1	15
1990	--	38	285	46	0	16
1991	--	12	132	37	1	8
1992	--	29	209	40	0	10
1993	4,274	21 (0.49)	231 (5.40)	54 (1.26)	0	12 (0.28)
1994	4,539	15 (0.33)	158 (3.48)	40 (0.88)	1 (0.02)	9 (0.20)
1995	--	15	198	58	1	38
1996	--	56	912	129	0	123
1997	--	22	591	1	--	1
1998	--	21	3	--	--	--
Subbasin hatchery,						
Big Creek,						
1987	28,000	--	--	1 (0.004)	--	2 (0.007)
1988	4,890	--	5 (0.10)	6 (0.12)	--	3 (0.06)
1989	36,038	--	281 (0.78)	138 (0.38)	1 (0.003)	11 (0.03)
1990	20,434	--	129 (0.63)	72 (0.35)	--	6 (0.03)
Mixed,[b]						
1991	4,595	6 (0.13)	20 (0.44)	2 (0.04)	--	0
Hood River,[c]						
1992	48,985	1 (0.002)	77 (0.16)	17 (0.03)	0	1 (0.002)
1993	38,034	12 (0.03)	251 (0.66)	99 (0.26)	0	13 (0.03)
1994	42,860	10 (0.02)	526 (1.23)	128 (0.30)	1 (0.002)	10 (0.02)
1995	50,896	8 (0.02)	260 (0.51)	123 (0.24)	2 (0.004)	13 (0.03)
1996	59,837	3 (0.005)	167 (0.28)	47 (0.08)	0	14 (0.02)
1997	62,135	12 (0.02)	220 (0.35)	159 (0.26)	--	27 (0.04)
1998	46,781	8 (0.02)	704 (1.50)	--	--	1 (0.002)
1999	63,182	9 (0.01)	--	--	--	--
2000	50,879	--	--	--	--	--

Table 52. Continued.

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[a] Complete brood returns are available beginning with the 1989 wild and 1990 hatchery broods, as determined based on age structure for adult winter steelhead sampled at the Powerdale Dam trap. Estimates of escapement for prior brood years do not include adult returns from all possible age categories.

[b] Returns from the 1991 brood are progeny of wild x Big Creek stock hatchery crosses.

[c] Beginning with the 1995 brood release, hatchery smolts were volitionally released from acclimation facilities located in the Hood River subbasin. Hatchery smolts were held at the facilities for up to two weeks prior to release.

Table 53. Estimates of Hood River stock hatchery winter steelhead subbasin smolt production releases, adult escapements to the mouth of the Hood River, smolt to adult survival rate, and percent difference from the wild smolt to adult survival rate. Estimates are by year of migration. Year of migration is bold faced for those years in which estimates of adult escapements back to the mouth of the Hood River subbasin are more than 98% complete.

Release strategy, year of smolt migration	Smolts[a]	Adult returns		Smolt to adult survival	
		Run years	No.	Percent survival	Δ% from wild est.
Direct release,					
1994	38,034	1994/95-1998/99	685	1.80	-74.47
1995	42,860	1995/96-1999/00	1,022	2.38	-74.81
Acclimated,					
1996	50,896	1996/97-2000/01	580	1.14	-80.78
1997	59,837	1997/98-2000/01	385	0.64	-82.51
1998	62,135	1998/99-2000/01	647	1.04	-82.92
1999	46,781	1999/00-2000/01	940	2.01	-67.99
2000	63,182	2000/01-2000/01	14	0.02	-98.10

[a] Hood River stock hatchery winter steelhead smolts were first released into the Hood River subbasin in 1993 (1992 brood). The entire production release was first acclimated in 1996 (1995 brood). Hatchery smolts are acclimated from one to two weeks prior to being volitionally released into both the East and Middle forks of the Hood River.

Table 54. Age composition (percent) of adult winter steelhead sampled at the Powerdale Dam trap; by origin, stock, run year, and age category. Estimates in a given run year may not add to 100% due to rounding error.

Origin, stock, run year	N	Freshwater/Ocean age													Repeat spawners
		1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	3/4	
Wild,															
Hood River,															
1991-1992	663	--	1.4	0.2	0.5	60.6	16.0	0.2	0.6	10.9	2.4	0	0	0	7.4
1992-1993	394	--	8.9	0.3	0.5	42.4	4.8	0	1.5	29.7	3.8	0	0.3	0	7.9
1993-1994	371	--	2.2	0.3	0.5	67.7	4.0	0	1.6	19.4	1.1	0	0	0	3.2
1994-1995	190	--	13.7	1.6	0.5	51.1	4.2	0	0.5	16.8	1.6	0	0.5	0.5	8.9
1995-1996	270	--	6.7	0.4	4.1	65.2	7.8	0	0.4	10.4	2.2	0.4	0	0	2.6
1996-1997	275	--	4.0	1.1	0.4	69.1	8.4	0.4	0.4	11.3	2.5	0	0	0	2.5
1997-1998	208	--	5.8	1.4	0.5	60.1	8.2	0	0	18.3	1.0	0	0	0	4.8
1998-1999	286	--	18.2	0.7	2.8	52.1	7.3	0	0	12.6	3.5	0	0	0	2.8
1999-2000	905	--	0.7	0.1	0.4	85.9	4.4	0	0.1	4.6	0.2	0	0.1	0	3.4
2000-2001	1,000	--	2.1	1.6	0.3	57.6	10.9	0.1	0.1	12.6	1.3	0	0.1	0	13.3
Subbasin hatchery,															
Big Creek,															
1991-1992	247	--	--	--	93.1	2.0	--	--	2.4	0.4	--	0	--	--	2.0
1992-1993	187	--	--	--	31.0	0	--	--	64.2	0	--	0	--	--	4.8
1993-1994	130	--	--	--	--	50.8	--	--	45.4	0	--	0	--	--	3.8
1994-1995	9	--	--	--	--	--	--	--	--	66.7	--	0	--	--	33.3
Mixed,[a]															
1992-1993	6	100	--	--	--	--	--	--	--	--	--	--	--	--	--
1993-1994	13	--	--	--	100	--	--	--	--	--	--	--	--	--	--
1994-1995	8	--	--	--	--	75.0	--	--	25.0	--	--	--	--	--	--
Hood River,															
1993-1994	1	100	--	--	--	--	--	--	--	--	--	--	--	--	--
1994-1995	83	13.3	0	--	85.5	--	--	--	--	--	--	--	--	--	1.2
1995-1996	259	3.9	0	--	90.0	0	--	--	6.2	--	--	--	--	--	0
1996-1997	611	1.1	0	--	82.7	0.7	--	--	14.9	0	--	0	--	--	0.7
1997-1998	363	0.3	0.3	--	60.6	0.8	--	--	34.4	0.3	--	0	--	--	3.3

Table 54. Continued.

Origin, stock, run year	N	Freshwater/Ocean age												Repeat spawners
		1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	3/4	
Subbasin hatchery, Hood River, (cont.)															
1998-1999	303	3.6	0	--	49.5	5.6	--	--	37.3	0	--	0.3	--	--	3.6
1999-2000	290	2.1	0	--	71.4	3.1	--	--	16.2	1.7	--	0.3	--	--	5.2
2000-2001	897	1.0	0.2	--	76.5	0.7	--	--	17.5	0	--	0	0.1	--	4.0
Stray hatchery, Unknown,															
1991-1992	21	--	--	--	38.1	0	--	--	61.9	--	--	0	--	--	0
1992-1993	20	--	--	--	75.0	0	--	--	25.0	--	--	0	--	--	0
1993-1994	20	--	--	--	0	5.0	--	--	95.0	--	--	0	--	--	0
1994-1995	3	--	--	--	33.3	0	--	--	66.7	--	--	0	--	--	0
1995-1996	5	--	--	--	100	0	--	--	0	--	--	0	--	--	0
1996-1997	2	--	--	--	100	0	--	--	0	--	--	0	--	--	0
1997-1998	3	--	--	--	66.7	33.3	--	--	0	--	--	0	--	--	0
1998-1999	7	--	--	--	42.9	0	--	--	57.1	--	--	0	--	--	0
1999-2000	1	--	--	--	0	0	--	--	0	--	--	100	--	--	0
2000-2001	37	--	2.7	--	43.2	24.3	--	--	27.0	2.7	--	0	--	--	0

[a] Returns from the 1991 brood are progeny of wild x Big Creek stock hatchery crosses.

Table 55. Mean fork length (cm) of wild adult winter steelhead with spawning checks; by sample population (i.e., sex) and age category. Fish were sampled from the 1999-2000 run year of winter steelhead escaping to the adult trap located at Powerdale Dam.

Sample pop.,	Freshwater/Ocean age					
statistic	3/1S.2S.3	2/2S.3	2/1S.2	3/2S.3	2/2S.3S.4	3/1S.2
Females,						
N	1	12	2	--	--	--
Mean	70.0	72.12	60.75	--	--	--
STD	--	3.18	1.77	--	--	--
Range	70.0	69.0-80.0	59.5-62.0	--	--	--
Males,						
N	--	7	5	1	1	1
Mean	--	68.14	60.20	62.0	87.5	50.5
STD	--	4.03	3.58	--	--	--
Range	--	62.5-73.0	57.0-65.0	62.0	87.5	50.5
Totals,						
N	1	19	7	1	1	1
Mean	70.0	70.66	60.36	62.0	87.5	50.5
STD	--	3.94	3.02	--	--	--
Range	70.0	62.5-80.0	57.0-65.0	62.0	87.5	50.5

Table 56. Mean fork length (cm) of subbasin hatchery adult winter steelhead (i.e., Hood River stock) with spawning checks; by sample population (i.e., sex) and age category. Fish were sampled from the 1999-2000 run year of winter steelhead escaping to the adult trap located at Powerdale Dam.

Sample pop.,	Freshwater/Ocean age				
statistic	2/2S.3	1/2S.3S.4	1/3S.4	1/2S.3	1/1S.2
Females,					
N	--	1	3	6	--
Mean	--	77.5	77.67	65.50	--
STD	--	--	4.04	2.70	--
Range	--	77.5	73.0-80.0	62.5-69.5	--
Males,					
N	2	--	--	2	1
Mean	68.00	--	--	69.00	61.0
STD	9.19	--	--	5.66	--
Range	61.5-74.5	--	--	65.0-73.0	61.0
Totals,					
N	2	1	3	8	1
Mean	68.00	77.5	77.67	66.38	61.0
STD	9.19	--	4.04	3.52	--
Range	61.5-74.5	77.5	73.0-80.0	62.5-73.0	61.0

Table 57. Mean fork length (cm) of wild adult winter steelhead with spawning checks; by sample population (i.e., sex) and age category. Fish were sampled from the 2000-2001 run year of winter steelhead escaping to the adult trap located at Powerdale Dam.

Sample pop.,	Freshwater/Ocean age									
statistic	3/3S.4	2/2S.4	3/2S.3	2/2S.3S.4	2/3S.4	2/2S.3	3/2S.3S.4	3/1S.2S.3	2/1S.2S.3	2/1S.2
Females,										
N	1	1	9	2	2	98	--	--	--	--
Mean	86.0	80.0	72.06	84.25	83.00	73.52	--	--	--	--
STD	--	--	4.44	1.06	1.41	4.08	--	--	--	--
Range	86.0	80.0	64.0-77.0	83.5-85.0	82.0-84.0	59.5-84.0	--	--	--	--
Males,										
N	--	--	--	1	--	12	1	1	1	1
Mean	--	--	--	68.5	--	71.42	67.5	64.5	65.5	60.0
STD	--	--	--	--	--	11.96	--	--	--	--
Range	--	--	--	68.5	--	37.0-88.5	67.5	64.5	65.5	60.0
Totals,										
N	1	1	9	3	2	110	1	1	1	1
Mean	86.0	80.0	72.06	79.00	83.00	73.29	67.5	64.5	65.5	60.0
STD	--	--	4.44	9.12	1.41	5.45	--	--	--	--
Range	86.0	80.0	64.0-77.0	68.5-85.0	82.0-84.0	37.0-88.5	67.5	64.5	65.5	60.0

Table 58. Mean fork length (cm) of subbasin hatchery adult winter steelhead (i.e., Hood River stock) with spawning checks; by sample population (i.e., sex) and age category. Fish were sampled from the 2000-2001 run year of winter steelhead escaping to the adult trap located at Powerdale Dam.

Sample pop., statistic	Freshwater/Ocean age						
	2/3S.4	2/2S.3	1/2S.3S.4	1/3S.4	1/2S.3	1/1S.2	1/1S.3
Females,							
N	3	1	3	2	20	1	--
Mean	79.67	73.5	73.33	81.00	73.55	51.5	--
STD	3.21	--	3.88	2.83	5.90	--	--
Range	76.0-82.0	73.5	69.0-76.5	79.0-83.0	65.0-84.0	51.5	--
Males,							
N	--	--	--	--	5	--	1
Mean	--	--	--	--	72.70	--	77.0
STD	--	--	--	--	8.17	--	--
Range	--	--	--	--	67.5-87.0	--	77.0
Totals,							
N	3	1	3	2	25	1	1
Mean	79.67	73.5	73.33	81.00	73.38	51.5	77.0
STD	3.21	--	3.88	2.83	6.23	--	--
Range	76.0-82.0	73.5	69.0-76.5	79.0-83.0	65.0-87.0	51.5	77.0

Table 59. Mean fork length (cm) of adult winter steelhead without spawning checks; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 1999-2000 run year of winter steelhead escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop., statistic	Freshwater/Ocean age											Sample[a]
	1/1	1/2	1/3	1/4	2/1	2/2	2/3	2/4	3/1	3/2	3/3	mean
Wild,												
Hood River,												
Females,												
N	--	2	--	--	1	474	32	--	--	27	1	555
Mean	--	64.75	--	--	57.5	65.88	75.91	--	--	66.17	77.5	66.59
STD	--	5.30	--	--	--	3.74	4.08	--	--	3.58	--	4.52
Range	--	61.0-68.5	--	--	57.5	50.5-78.5	68.0-83.0	--	--	58.0-72.0	77.5	50.5-83.0
Males,												
N	--	2	1	--	5	303	10	1	1	13	1	353
Mean	--	60.25	78.5	--	49.60	67.50	75.25	100.0	45.0	68.50	81.0	67.43
STD	--	0.35	--	--	7.15	4.12	6.17	--	--	3.55	--	5.66
Range	--	60.0-60.5	78.5	--	43.0-60.5	44.0-78.0	69.0-85.0	100.0	45.0	65.0-75.5	81.0	43.0-100.0
Totals,												
N	--	4	1	--	6	777	42	1	1	40	2	908
Mean	--	62.50	78.5	--	50.92	66.51	75.75	100.0	45.0	66.92	79.25	66.92
STD	--	4.02	--	--	7.17	3.97	4.59	--	--	3.70	2.47	5.01
Range	--	60.0-68.5	78.5	--	43.0-60.5	44.0-78.5	68.0-85.0	100.0	45.0	58.0-75.5	77.5-81.0	43.0-100.0
Subbasin hatchery,												
Hood River,												
Females,												
N	--	90	34	1	--	7	2	--	--	--	--	144
Mean	--	63.97	74.93	82.0	--	66.79	72.00	--	--	--	--	67.38
STD	--	3.48	3.82	--	--	4.12	12.73	--	--	--	--	6.24
Range	--	56.5-74.0	67.0-84.0	82.0	--	61.5-73.0	63.0-81.0	--	--	--	--	56.5-84.0
Males,												
N	6	117	13	--	--	2	3	--	--	--	--	146
Mean	43.92	64.21	79.65	--	--	73.00	66.00	--	--	--	--	65.00
STD	1.86	3.98	4.18	--	--	1.41	4.36	--	--	--	--	7.41
Range	40.5-46.0	50.5-73.5	72.0-85.0	--	--	72.0-74.0	61.0-69.0	--	--	--	--	40.5-85.0
Totals,												
N	6	207	47	1	--	9	5	--	--	--	--	290
Mean	43.92	64.11	76.23	82.0	--	68.17	68.40	--	--	--	--	66.18
STD	1.86	3.77	4.43	--	--	4.53	7.80	--	--	--	--	6.94
Range	40.5-46.0	50.5-74.0	67.0-85.0	82.0	--	61.5-74.0	61.0-81.0	--	--	--	--	40.5-85.0

[a] Mean estimates include steelhead with spawning checks and steelhead in which the origin, but not the age of the fish could be determined from the scale sample.

Table 60. Mean fork length (cm) of adult winter steelhead without spawning checks; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 2000-2001 run year of winter steelhead escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop., statistic	Freshwater/Ocean age											Sample[a]
	1/1	1/2	1/3	2/1	2/2	2/3	2/4	3/1	3/2	3/3	4/2	mean
Wild,												
Hood River,												
Females,												
N	--	1	1	1	327	95	1	3	79	9	1	634
Mean	--	65.0	82.5	51.0	66.60	77.92	77.0	56.17	66.75	77.11	76.0	69.79
STD	--	--	--	--	4.00	3.38	--	1.76	3.11	5.26	--	6.13
Range	--	65.0	82.5	51.0	43.0-79.0	68.0-84.5	77.0	54.5-58.0	58.0-74.5	64.5-82.0	76.0	43.0-86.0
Males,												
N	--	2	--	20	248	31	--	13	30	4	--	367
Mean	--	64.00	--	50.38	68.77	83.26	--	50.12	71.53	82.38	--	68.77
STD	--	4.24	--	3.48	4.53	6.36	--	3.59	4.58	10.18	--	8.81
Range	--	61.0-67.0	--	45.0-58.0	47.5-79.0	68.0-96.0	--	45.0-57.5	61.0-82.0	67.5-90.5	--	37.0-96.0
Totals,												
N	--	3	1	21	576	126	1	16	109	13	1	1,002
Mean	--	64.33	82.5	50.40	67.55	79.23	77.0	51.25	68.06	78.73	76.0	69.42
STD	--	3.06	--	3.39	4.37	4.86	--	4.08	4.15	7.13	--	7.23
Range	--	61.0-67.0	82.5	45.0-58.0	43.0-79.0	68.0-96.0	77.0	45.0-58.0	58.0-82.0	64.5-90.5	76.0	37.0-96.0
Subbasin hatchery,												
Hood River,												
Females,												
N	2	259	105	--	4	--	--	--	--	--	--	400
Mean	45.25	65.74	76.97	--	62.88	--	--	--	--	--	--	69.17
STD	3.89	3.36	3.62	--	4.96	--	--	--	--	--	--	6.56
Range	42.5-48.0	54.0-81.0	69.0-85.5	--	58.0-68.5	--	--	--	--	--	--	42.5-85.5
Males,												
N	7	426	52	2	2	--	1	--	--	--	--	496
Mean	46.79	67.46	82.82	45.75	71.75	--	84.5	--	--	--	--	68.81
STD	3.58	3.52	5.16	1.06	6.72	--	--	--	--	--	--	6.79
Range	43.0-54.0	55.0-78.0	67.5-94.5	45.0-46.5	67.0-76.5	--	84.5	--	--	--	--	43.0-94.5
Totals,												
N	9	686	157	2	6	--	1	--	--	--	--	897
Mean	46.44	66.81	78.91	45.75	65.83	--	84.5	--	--	--	--	68.97
STD	3.46	3.55	5.00	1.06	6.69	--	--	--	--	--	--	6.69
Range	42.5-54.0	54.0-81.0	67.5-94.5	45.0-46.5	58.0-76.5	--	84.5	--	--	--	--	42.5-94.5

[a] Mean estimates include steelhead with spawning checks and steelhead in which the origin, but not the age of the fish could be determined from the scale sample.

Table 61. Mean fork length (cm) of adult winter steelhead without spawning checks; by origin, stock, brood year, and age category. [Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables and in Olsen et al. (1994), Olsen et al. (1995), Olsen et al. (1996), Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).]

Origin, stock, brood year	Freshwater/Ocean age												
	1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	3/4
Wild,													
Hood River,													
1986	--	--	--	--	--	--	60 (1)	--	--	78 (16)	--	--	--
1987	--	--	--	--	--	65 (106)	--	--	76 (72)	80 (15)	--	95 (1)	--
1988	--	--	52 (1)	--	66 (402)	65 (19)	--	77 (4)	77 (117)	78 (4)	--	--	72 (1)
1989	--	49 (9)	55 (1)	62 (3)	66 (167)	65 (15)	--	77 (6)	77 (72)	77 (3)	--	84 (1)	--
1990	--	52 (35)	47 (1)	59 (2)	68 (251)	65 (8)	--	80 (6)	78 (32)	80 (6)	--	--	--
1991	--	50 (8)	54 (3)	58 (2)	67 (97)	67 (21)	63 (1)	78 (1)	79 (28)	79 (7)	88 (1)	--	--
1992	--	54 (26)	48 (1)	76 (1)	68 (176)	68 (23)	--	74 (1)	79 (31)	75 (2)	--	--	--
1993	--	52 (18)	50 (3)	68 (11)	68 (190)	65 (17)	--	88 (1)	78 (38)	77 (10)	--	--	--
1994	--	49 (11)	50 (3)	65 (1)	65 (125)	68 (21)	--	--	75 (36)	79 (2)	--	100 (1)	--
1995	--	50 (12)	54 (2)	58 (1)	69 (149)	67 (40)	76 (1)	--	76 (42)	79 (13)	--	77 (1)	--
1996	--	52 (52)	45 (1)	59 (8)	67 (777)	68 (109)	--	78 (1)	79 (126)	--	--	--	--
1997	--	51 (6)	51 (16)	62 (4)	68 (576)	--	--	82 (1)	--	--	--	--	--
1998	--	50 (21)	--	64 (3)	--	--	--	--	--	--	--	--	--
Subbasin hatchery,													
Big Creek,													
1987	--	--	--	--	--	--	--	--	76 (1)	--	--	--	--
1988	--	--	--	--	73 (5)	--	--	75 (6)	--	--	--	--	--
1989	--	--	--	64 (230)	--	--	--	77 (120)	--	--	--	--	--
1990	--	--	--	62 (58)	65 (66)	--	--	77 (59)	76 (6)	--	--	--	--
Mixed,[a]													
1991	57 (6)	--	--	67 (13)	65 (6)	--	--	72 (2)	--	--	--	--	--
Hood River,													
1992	56 (1)	--	--	65 (71)	--	--	--	77 (16)	--	--	--	--	--
1993	48 (11)	--	--	66 (233)	67 (4)	--	--	80 (91)	86 (1)	--	--	--	--
1994	46 (10)	--	--	66 (505)	64 (3)	--	--	77 (125)	--	--	78 (1)	--	--
1995	44 (7)	46 (1)	--	62 (220)	70 (17)	--	--	76 (113)	68 (5)	--	82 (1)	84 (1)	--

Table 61. Continued.

Origin, stock, brood year	Freshwater/Ocean age												
	1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	3/4
Subbasin hatchery,													
Hood River, (cont.)													
1996	44 (1)	--	--	63 (150)	68 (9)	--	--	76 (47)	--	--	--	--	--
1997	47 (11)	--	--	64 (207)	66 (6)	--	--	79 (157)	--	--	--	--	--
1998	44 (6)	46 (2)	--	67 (686)	--	--	--	--	--	--	--	--	--
1999	46 (9)	--	--	--	--	--	--	--	--	--	--	--	--
Stray hatchery,													
Unknown,													
1988	--	--	--	--	--	--	--	80 (13)	--	--	--	--	--
1989	--	--	--	64 (8)	--	--	--	77 (5)	--	--	--	--	--
1990	--	--	--	64 (15)	58 (1)	--	--	81 (19)	--	--	--	--	--
1991	--	--	--	--	--	--	--	82 (2)	--	--	--	--	--
1992	--	--	--	62 (1)	--	--	--	--	--	--	--	--	--
1993	--	--	--	63 (5)	--	--	--	--	--	--	--	--	--
1994	--	--	--	64 (2)	62 (1)	--	--	--	--	--	--	--	--
1995	--	--	--	67 (2)	--	--	--	70 (4)	--	--	74 (1)	--	--
1996	--	--	--	64 (3)	--	--	--	--	68 (1)	--	--	--	--
1997	--	--	--	--	67 (9)	--	--	71 (10)	--	--	--	--	--
1998	--	44 (1)	--	67 (16)	--	--	--	--	--	--	--	--	--

[a] Returns from the 1991 brood are progeny of wild x Big Creek hatchery crosses.

Table 62. Mean weight (kg) of adult winter steelhead without spawning checks; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 1999-2000 run year of winter steelhead escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop., statistic	Freshwater/Ocean age											Sample[a]
	1/1	1/2	1/3	1/4	2/1	2/2	2/3	2/4	3/1	3/2	3/3	mean
Wild,												
Hood River,												
Females,												
N	--	2	--	--	1	473	32	--	--	26	1	553
Mean	--	2.75	--	--	2.0	3.06	4.57	--	--	3.05	4.4	3.15
STD	--	0.49	--	--	--	0.55	0.83	--	--	0.56	--	0.68
Range	--	2.4-3.1	--	--	2.0	1.5-5.5	3.2-6.8	--	--	1.9-4.1	4.4	1.5-6.8
Males,												
N	--	2	1	--	5	303	10	1	1	13	1	352
Mean	--	2.50	4.4	--	1.34	3.11	4.27	7.0	1.0	3.25	5.7	3.12
STD	--	0.42	--	--	0.59	0.57	1.29	--	--	0.67	--	0.77
Range	--	2.2-2.8	4.4	--	0.9-2.3	1.0-5.0	2.9-6.5	7.0	1.0	2.4-5.0	5.7	0.9-7.0
Totals,												
N	--	4	1	--	6	776	42	1	1	39	2	905
Mean	--	2.62	4.4	--	1.45	3.08	4.50	7.0	1.0	3.12	5.05	3.14
STD	--	0.40	--	--	0.59	0.56	0.95	--	--	0.60	0.92	0.71
Range	--	2.2-3.1	4.4	--	0.9-2.3	1.0-5.5	2.9-6.8	7.0	1.0	1.9-5.0	4.4-5.7	0.9-7.0
Subbasin hatchery,												
Hood River,												
Females,												
N	--	90	34	1	--	7	2	--	--	--	--	144
Mean	--	2.74	4.46	6.0	--	2.97	3.80	--	--	--	--	3.24
STD	--	0.45	0.82	--	--	0.54	1.84	--	--	--	--	0.97
Range	--	1.9-3.9	2.9-6.4	6.0	--	2.5-3.7	2.5-5.1	--	--	--	--	1.9-6.4
Males,												
N	6	116	13	--	--	2	3	--	--	--	--	145
Mean	0.95	2.66	4.75	--	--	3.70	2.80	--	--	--	--	2.80
STD	0.14	0.50	0.68	--	--	0.14	0.53	--	--	--	--	0.88
Range	0.7-1.1	1.5-3.9	3.5-5.7	--	--	3.6-3.8	2.2-3.2	--	--	--	--	0.7-5.7
Totals,												
N	6	206	47	1	--	9	5	--	--	--	--	289
Mean	0.95	2.69	4.54	6.0	--	3.13	3.20	--	--	--	--	3.02
STD	0.14	0.48	0.79	--	--	0.57	1.13	--	--	--	--	0.95
Range	0.7-1.1	1.5-3.9	2.9-6.4	6.0	--	2.5-3.8	2.2-5.1	--	--	--	--	0.7-6.4

[a] Mean estimates include steelhead with spawning checks and steelhead in which the origin, but not the age of the fish could be determined from the scale sample.

Table 63. Mean weight (kg) of adult winter steelhead without spawning checks; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 2000-2001 run year of winter steelhead escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop., statistic	Freshwater/Ocean age											Sample[a]
	1/1	1/2	1/3	2/1	2/2	2/3	2/4	3/1	3/2	3/3	4/2	mean
Wild,												
Hood River,												
Females,												
N	--	1	1	1	326	95	1	3	79	9	1	633
Mean	--	2.9	5.3	1.3	3.08	4.83	4.7	1.87	3.03	4.59	4.5	3.55
STD	--	--	--	--	0.57	0.70	--	0.06	0.50	0.98	--	0.95
Range	--	2.9	5.3	1.3	0.7-4.8	2.9-6.3	4.7	1.8-1.9	2.0-4.6	2.3-5.5	4.5	0.7-6.3
Males,												
N	--	2	--	20	247	31	--	13	30	4	--	366
Mean	--	2.55	--	1.25	3.24	5.60	--	1.22	3.59	5.40	--	3.33
STD	--	0.49	--	0.18	0.67	1.24	--	0.25	0.68	1.79	--	1.21
Range	--	2.2-2.9	--	1.0-1.6	1.1-4.8	2.8-8.5	--	0.8-1.7	2.1-5.2	2.8-6.9	--	0.5-8.5
Totals,												
N	--	3	1	21	574	126	1	16	109	13	1	1,000
Mean	--	2.67	5.3	1.25	3.15	5.02	4.7	1.34	3.18	4.84	4.5	3.47
STD	--	0.40	--	0.18	0.62	0.92	--	0.35	0.61	1.26	--	1.06
Range	--	2.2-2.9	5.3	1.0-1.6	0.7-4.8	2.8-8.5	4.7	0.8-1.9	2.0-5.2	2.3-6.9	4.5	0.5-8.5
Subbasin hatchery,												
Hood River,												
Females,												
N	2	258	104	--	4	--	--	--	--	--	--	398
Mean	0.95	2.89	4.52	--	2.65	--	--	--	--	--	--	3.39
STD	0.21	0.47	0.64	--	0.64	--	--	--	--	--	--	0.95
Range	0.8-1.1	1.4-5.4	2.4-6.1	--	2.0-3.2	--	--	--	--	--	--	0.8-6.1
Males,												
N	7	426	52	2	2	--	1	--	--	--	--	496
Mean	0.94	2.97	5.31	0.95	3.75	--	6.2	--	--	--	--	3.20
STD	0.18	0.51	0.94	0.07	0.64	--	--	--	--	--	--	0.99
Range	0.8-1.3	1.2-4.6	2.9-7.7	0.9-1.0	3.3-4.2	--	6.2	--	--	--	--	0.8-7.7
Totals,												
N	9	685	156	2	6	--	1	--	--	--	--	895
Mean	0.94	2.94	4.79	0.95	3.02	--	6.2	--	--	--	--	3.28
STD	0.17	0.50	0.84	0.07	0.81	--	--	--	--	--	--	0.97
Range	0.8-1.3	1.2-5.4	2.4-7.7	0.9-1.0	2.0-4.2	--	6.2	--	--	--	--	0.8-7.7

[a] Mean estimates include steelhead with spawning checks and steelhead in which the origin, but not the age of the fish could be determined from the scale sample.

Table 64. Mean weight (kg) of adult winter steelhead without spawning checks; by origin, stock, brood year, and age category. [Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables and in Olsen et al. (1995), Olsen et al. (1996), Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).]

Origin, stock, brood year	Freshwater/Ocean age												
	1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	3/4
Wild,													
Hood River,													
1988	--	--	--	--	--	--	--	--	--	4.5 (2)	--	--	3.2 (1)
1989	--	--	--	--	--	2.8 (13)	--	--	4.8 (40)	4.6 (3)	--	6.9 (1)	--
1990	--	--	1.1 (1)	--	3.3 (215)	2.7 (8)	--	5.4 (4)	4.8 (32)	4.9 (5)	--	--	--
1991	--	1.3 (8)	1.4 (2)	2.4 (1)	3.1 (95)	3.0 (21)	2.3 (1)	4.7 (1)	5.1 (27)	5.1 (6)	6.0 (1)	--	--
1992	--	1.6 (26)	1.2 (1)	4.6 (1)	3.2 (172)	3.2 (23)	--	3.5 (1)	5.0 (30)	3.6 (2)	--	--	--
1993	--	1.5 (18)	1.3 (3)	3.2 (11)	3.2 (190)	2.7 (17)	--	6.6 (1)	4.8 (38)	4.7 (10)	--	--	--
1994	--	1.2 (11)	1.3 (3)	2.5 (1)	2.9 (125)	3.5 (21)	--	--	4.5 (36)	5.0 (2)	--	7.0 (1)	--
1995	--	1.3 (12)	1.5 (2)	2.0 (1)	3.5 (149)	3.1 (39)	4.5 (1)	--	4.5 (42)	4.8 (13)	--	4.7 (1)	--
1996	--	1.5 (52)	1.0 (1)	1.8 (8)	3.1 (776)	3.2 (109)	--	4.4 (1)	5.0 (126)	--	--	--	--
1997	--	1.4 (6)	1.3 (16)	2.6 (4)	3.2 (574)	--	--	5.3 (1)	--	--	--	--	--
1998	--	1.3 (21)	--	2.7 (3)	--	--	--	--	--	--	--	--	--
Subbasin hatchery,													
Big Creek,													
1990	--	--	--	--	--	--	--	3.9 (1)	4.6 (6)	--	--	--	--
Mixed,[a]													
1991	--	--	--	2.5 (3)	3.0 (6)	--	--	3.8 (2)	--	--	--	--	--
Hood River,													
1992	1.5 (1)	--	--	2.8 (61)	--	--	--	4.7 (15)	--	--	--	--	--
1993	1.1 (11)	--	--	2.9 (230)	3.0 (4)	--	--	5.2 (89)	6.3 (1)	--	--	--	--
1994	1.0 (10)	--	--	2.9 (493)	2.7 (3)	--	--	4.6 (125)	--	--	5.4 (1)	--	--
1995	0.8 (6)	1.0 (1)	--	2.4 (220)	3.5 (17)	--	--	4.5 (112)	3.2 (5)	--	6.0 (1)	6.2 (1)	--
1996	1.0 (1)	--	--	2.7 (150)	3.1 (9)	--	--	4.5 (47)	--	--	--	--	--
1997	1.1 (11)	--	--	2.7 (206)	3.0 (6)	--	--	4.8 (156)	--	--	--	--	--
1998	1.0 (6)	1.0 (2)	--	2.9 (685)	--	--	--	--	--	--	--	--	--
1999	0.9 (9)	--	--	--	--	--	--	--	--	--	--	--	--

Table 64. Continued.

Origin, stock, brood year	Freshwater/Ocean age												
	1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	3/4
Stray hatchery,													
Unknown,													
1990	--	--	--	--	--	--	--	5.0 (3)	--	--	--	--	--
1991	--	--	--	--	--	--	--	4.9 (2)	--	--	--	--	--
1992	--	--	--	2.3 (1)	--	--	--	--	--	--	--	--	--
1993	--	--	--	2.6 (5)	--	--	--	--	--	--	--	--	--
1994	--	--	--	2.6 (1)	2.1 (1)	--	--	--	--	--	--	--	--
1995	--	--	--	2.9 (2)	--	--	--	3.6 (4)	--	--	4.5 (1)	--	--
1996	--	--	--	3.2 (3)	--	--	--	--	2.7 (1)	--	--	--	--
1997	--	--	--	--	3.3 (9)	--	--	3.6 (9)	--	--	--	--	--
1998	--	0.8 (1)	--	2.9 (16)	--	--	--	--	--	--	--	--	--

[a] Returns from the 1991 brood are progeny of wild x Big Creek stock hatchery crosses.

Table 65. Adult winter steelhead sex ratios as a percentage of females; by origin, stock, run year, and age category. Fish were sampled at the Powerdale Dam trap. (Sample size is in parentheses.)

Origin, stock, run year	Freshwater/Ocean age													Repeat spawners
	1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	3/4	
Wild,														
Hood River,														
1991-1992	--	0 (9)	0 (1)	67 (3)	58 (402)	64 (106)	100 (1)	75 (4)	62 (72)	88 (16)	--	--	--	64 (47)
1992-1993	--	26 (35)	100 (1)	50 (2)	62 (167)	42 (19)	--	67 (6)	72 (117)	60 (15)	--	0 (1)	--	87 (31)
1993-1994	--	12 (8)	0 (1)	0 (2)	69 (251)	60 (15)	--	67 (6)	67 (72)	75 (4)	--	--	--	100 (11)
1994-1995	--	19 (26)	0 (3)	0 (1)	58 (97)	25 (8)	--	100 (1)	53 (32)	100 (3)	--	100 (1)	100 (1)	69 (16)
1995-1996	--	22 (18)	0 (1)	45 (11)	65 (176)	43 (21)	--	100 (1)	68 (28)	50 (6)	0 (1)	--	--	57 (7)
1996-1997	--	18 (11)	67 (3)	0 (1)	61 (190)	70 (23)	100 (1)	0 (1)	58 (31)	71 (7)	--	--	--	100 (7)
1997-1998	--	0 (12)	33 (3)	100 (1)	66 (125)	71 (17)	--	--	59 (37)	50 (2)	--	--	--	67 (9)
1998-1999	--	21 (52)	0 (2)	38 (8)	72 (149)	62 (21)	--	--	81 (36)	90 (10)	--	--	--	100 (6)
1999-2000	--	17 (6)	0 (1)	50 (4)	61 (777)	68 (40)	--	0 (1)	76 (42)	50 (2)	--	0 (1)	--	50 (30)
2000-2001	--	5 (21)	19 (16)	33 (3)	57 (575)	72 (109)	100 (1)	100 (1)	75 (126)	69 (13)	--	100 (1)	--	87 (130)
Subbasin hatchery,														
Big Creek,														
1991-1992	--	--	--	36 (230)	60 (5)	--	--	100 (6)	100 (1)	--	--	--	--	80 (5)
1992-1993	--	--	--	21 (58)	--	--	--	74 (120)	--	--	--	--	--	75 (8)
1993-1994	--	--	--	--	39 (66)	--	--	66 (59)	--	--	--	--	--	60 (5)
1994-1995	--	--	--	--	--	--	--	--	100 (6)	--	--	--	--	100 (3)
Mixed,[a]														
1992-1993	67 (6)	--	--	--	--	--	--	--	--	--	--	--	--	--
1993-1994	--	--	--	31 (13)	--	--	--	--	--	--	--	--	--	--
1994-1995	--	--	--	--	33 (6)	--	--	100 (2)	--	--	--	--	--	--
Hood River,														
1993-1994	0 (1)	--	--	--	--	--	--	--	--	--	--	--	--	--
1994-1995	9 (11)	--	--	52 (71)	--	--	--	--	--	--	--	--	--	100 (1)
1995-1996	0 (10)	--	--	37 (232)	--	--	--	67 (15)	--	--	--	--	--	--
1996-1997	14 (7)	--	--	45 (504)	25 (4)	--	--	62 (91)	--	--	--	--	--	100 (3)
1997-1998	0 (1)	0 (1)	--	48 (219)	100 (3)	--	--	73 (124)	0 (1)	--	--	--	--	64 (11)
1998-1999	0 (11)	--	--	46 (150)	59 (17)	--	--	63 (113)	--	--	0 (1)	--	--	55 (11)

Table 65. Continued.

Origin, stock, run year	Freshwater/Ocean age													Repeat spawners
	1/1	2/1	3/1	1/2	2/2	3/2	4/2	1/3	2/3	3/3	1/4	2/4	3/4	
Subbasin hatchery,														
Hood River, (cont.)														
1999-2000	0 (6)	--	--	43 (207)	78 (9)	--	--	72 (47)	40 (5)	--	100 (1)	--	--	67 (15)
2000-2001	22 (9)	0 (2)	--	38 (685)	67 (6)	--	--	67 (157)	--	--	--	0 (1)	--	83 (36)
Stray hatchery,														
Unknown,														
1991-1992	--	--	--	62 (8)	--	--	--	62 (13)	--	--	--	--	--	--
1992-1993	--	--	--	47 (15)	--	--	--	60 (5)	--	--	--	--	--	--
1993-1994	--	--	--	--	0 (1)	--	--	37 (19)	--	--	--	--	--	--
1994-1995	--	--	--	0 (1)	--	--	--	0 (2)	--	--	--	--	--	--
1995-1996	--	--	--	60 (5)	--	--	--	--	--	--	--	--	--	--
1996-1997	--	--	--	0 (2)	--	--	--	--	--	--	--	--	--	--
1997-1998	--	--	--	0 (2)	100 (1)	--	--	--	--	--	--	--	--	--
1998-1999	--	--	--	33 (3)	--	--	--	75 (4)	--	--	--	--	--	--
1999-2000	--	--	--	--	--	--	--	--	--	--	100 (1)	--	--	--
2000-2001	--	0 (1)	--	44 (16)	33 (9)	--	--	20 (10)	0 (1)	--	--	--	--	--

[a] Returns from the 1991 brood are progeny of wild x Big Creek stock hatchery crosses.

Table 66. Mean fecundity[a] of adult winter steelhead; by origin, ocean age, and run year. Fish were sampled at the Powerdale Dam trap.

Origin, ocean age, run year	N	Mean fork length (cm)	Fecundity (eggs/female) Mean	Range	95% C.I.
Wild,					
1 Salt,					
1995-1996	1	58.0	2,900	2,900	--
2 Salt,					
1991-1992	9	62.7	2,982	1,930 - 4,950	± 733
1992-1993	8	66.7	3,620	3,036 - 4,117	± 317
1993-1994	16	67.9	3,268	2,025 - 6,480	± 571
1994-1995	11	66.2	3,222	1,737 - 5,016	± 654
1995-1996	13	68.8	3,780	1,904 - 5,776	± 530
1996-1997	13	68.9	3,657	2,408 - 5,184	± 509
1997-1998	9	65.9	3,963	2,610 - 5,805	± 851
1998-1999	8	67.0	3,537	2,320 - 4,560	± 630
1999-2000	9	66.5	4,108	2,128 - 5,808	± 869
2000-2001	12	67.6	4,472	2,925 - 7,380	± 872
3 Salt,					
1991-1992	5	75.5	3,138	2,752 - 4,080	± 665
1992-1993	7	77.2	4,080	2,856 - 6,398	± 1,189
1993-1994	5	75.4	4,229	2,493 - 5,100	± 1,250
1994-1995	6	74.8	4,332	3,375 - 5,472	± 840
1995-1996	4	76.3	4,836	3,344 - 6,325	± 2,070
1996-1997	4	78.8	5,436	4,275 - 6,525	± 1,643
1997-1998	2	75.3	5,421	4,752 - 6,090	± 8,500
1998-1999	6	74.0	4,376	2,925 - 6,042	± 1,182
1999-2000	1	82.0	6,528	6,528	--
2000-2001	10	76.1	4,670	2,530 - 8,096	± 1,138
4 Salt,					
1991-1992	1	78.0	3,240	3,240	--
1992-1993	1	85.0	4,632	4,632	--
Subbasin hatchery,[b]					
2 Salt,					
1995-1996	4	64.9	2,726	2,025 - 3,878	± 1,326
1996-1997	6	64.7	3,424	2,975 - 4,048	± 523
1997-1998	6	62.9	2,957	1,590 - 4,350	± 941
1998-1999	6	60.9	3,414	2,320 - 6,201	± 1,468
1999-2000	3	65.0	3,187	2,142 - 3,770	± 2,253
2000-2001	2	70.3	3,616	3,344 - 3,888	± 3,456
3 Salt,					
1991-1992	1	76.5	2,560	2,560	--
1992-1993	0	--	--	--	--
1993-1994	0	--	--	--	--

Table 66. Continued.

Origin, ocean age, run year	N	Mean fork length (cm)	Fecundity (eggs/female) Mean	Range	95% C.I.
Subbasin hatchery,[b]					
3 Salt, (cont.)					
1994-1995	0	--	--	--	--
1995-1996	0	--	--	--	--
1996-1997	5	76.6	4,017	3,024 - 4,797	± 942
1997-1998	3	69.0	3,541	2,856 - 3,960	± 1,486
1998-1999	6	75.0	5,240	3,168 - 7,920	± 1,814
1999-2000	5	73.0	4,614	3,795 - 5,474	± 846
2000-2001	2	81.3	5,494	4,950 - 6,039	± 6,919
4 Salt,					
1997-1998	1	77.0	5,280	5,280	--

[a] Estimates were based on numbers of eggs collected from air spawned fish and may under estimate true fecundity (*see* **Methods**).

[b] Hood River stock.

Table 67. Bi-weekly counts of upstream migrant jack and adult spring chinook salmon captured at the Powerdale Dam trap; by origin, stock, and run year. Counts are boldfaced for the bi-weekly period in which the median date of migration of jack and adult spring chinook salmon occurred in each origin category. Mini-jack spring chinook salmon are summarized in parenthesis.

Origin, stock,	April		May		June		July		August		September		October		November		
run year	01-15	16-30	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-31	Total
Natural,																	
Hood River,[a]																	
1992	0	0	1	8	5	**11**	4	4	0	0	0	1	0	0	0	0	34
1993	0	0	1	4	3	9	**6**	7(1)	2	6	2	0	0	0	0	0	40(1)
1994	0	0	1	5	0	1	3	**8**	1	2	0	12	0	0	0	0	33
1995	0	0	0	2	4	2	**4**	4	0	0	1	1	0	0	0	0	18
1996	0	0	1	7	**50**	4	9	3(1)	8	6	1	0	0	0	0	0	89(1)
1997	0	0	1	8	**29**	14	5	6(6)	5(5)	0(1)	0	0	0(1)	0	0	0	68(13)
1998	0	0	3	7	18	8(1)	**5**(2)	7	2(2)	2	6	16	3	0	0	0	77(5)
1999	0	0	0	0	1	4	4	1	1	**1**(1)	4	7	0	0	0	0	23(1)
2000	0	0	3	10	6	**13**(1)	9	2(2)	0	12	5	4	0	0	0	0	64(3)
2001	0	0	1	13	6	**1**	2	5	2(1)	3	5	3	0	0	0	0	41(1)
Subbasin hatchery,																	
Carson,																	
1992	0	9	77	**145**	75	62	15	4	4	1	2	2	1	0	0	0	397
1993	0	1	25	**205**	89	51	51	15	4	9	5	0	0	0	0	0	455
1994	0	6	33	**162**	28	6	4	16	1	0	1	1	0	0	0	0	258
1995	0	0	0	4	**22**	2	4	1	0	0	0	0	0	0	0	0	33
Deschutes,																	
1993	0	0	0	0	0	0	0	0(1)	0	0	0	0	0	0	0	0	0(1)
1994	0	0	0	**3**	0	1	0	1	0	0	0	0	0	0	0	0	5
1995	0	0	0	2	6	**8**	5(2)	0(2)	0	0	0	0	0	0	0	0	21(4)
1996	0	0	0	0	**10**	4	1	0	0	0	0	0	0	0	0	0	15
1997	0	0	1	33	**107**	65	34	6(4)	15(5)	8(1)	0(1)	0	0	0	0	0	269(11)
1998	0	0	1	1	**10**(1)	1(4)	2(6)	0(3)	0	0	0	0	0	0	0	0	15(14)
1999	0	0	0	20	**30**	11(8)	8(95)	6(44)	4(16)	6(17)	2(1)	0	0	0	0(1)	0	87(182)
2000	0	1	6	58	**58**	19(221)	4(292)	0(263)	0(108)	2(24)	0(7)	0(3)	0	0	0	0	148(918)
2001	0	23	76	**595**	193	70(2)	67(13)	6(7)	7(8)	10(2)	3	0	0	0	0	0	1,050(32)

Table 67. Continued.

Origin, stock, run year	April 01-15	April 16-30	May 01-15	May 16-31	June 01-15	June 16-30	July 01-15	July 16-31	August 01-15	August 16-31	September 01-15	September 16-30	October 01-15	October 16-31	November 01-15	November 16-31	Total
Stray hatchery,																	
Unknown,																	
1992	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	1
1993	0	0	0	0	**1**	0	1	0	0	0	0	0	0	0	0	0	2
1994	0	0	0(1)	0	0	0	0(1)	0(4)	0(1)	0(2)	0	0	0	0	0(1)	0	0(10)
1995	0	0	0	0	0	0	0	0	0	1	**1**	1	0	0	0	0	3
1996	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	0	1
1997	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	0	0	0	0	**1**	0	0	1	0	0	0	0	0	0	0	0	2
1999	0	0	0	**1**	0	0	0	0(6)	0	0	0	0	0	0	0	0	1(6)
2000	0	0	0	1	0	**2**(1)	0	0	0(1)	0	0	0	0	0	0	0	3(2)
2001	0	1	2	1	1	0	**1**	2	3(1)	1	0	0	0	0	0	0	12(1)
Unknown,																	
Unknown,																	
1992	0	3	5	**8**	3	1	0	0	1	0	0	0	0	0	0	0	21
1993	0	0	0	**5**	0	0	2	1(2)	0(1)	0	0	0	0	0	0	0	8(3)
1994	0	0	1	**1**	0	1	0	0(2)	0	0	0	1	0	0	0	0	4(2)
1995	0	0	0	0	5	1	**1**	1	0	3	0	2	0	0	0	0	13
1996	0	0	0	1	8	**5**	5	1	1	3	1	0	0	0	0	0	25
1997	0	0	0	5	**9**	3	1	2	3	0	0	0	0	0	0	0	23
1998	0	0	0	1	0	1	0	**2**	0	0	0	2	1	0	0	0	7
1999	0	0	0	0	0	0	0	2	0	**4**	1	0	0	0	0	0	7
2000	0	0	0	0	0	0	0	0	0	0	**1**	1	0	0	0	0	2
2001	0	0	0	5	0	1	**1**(15)	2(19)	3(14)	9(3)	6	1	0	0	0	0	28(51)

[a] The natural run was developed from Deschutes and Carson stock hatchery production releases.

Table 68. Estimated harvest of natural jack and adult spring chinook salmon in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2000. Confidence limits (95%) are in parenthesis.

Period	Unmarked adult spring chinook salmon[a]		Unmarked[a] jack spring chinook salmon		Catch Rate
	Kept	Released	Kept	Released	(hrs/fish)
May 1-15	--	--	--	--	--
May 16-31	8 (9.2)	--	--	--	206
Jun 1-15	--	--	--	--	--
Jun 16-30	--	--	--	3 (4.3)	377
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Aug 1-15	--	--	--	--	--
Aug 16-31	--	--	--	--	--
Sep 1-15	--	3 (4.5)	--	--	140
Total	8 (9.2)	3 (4.5)	0	3 (4.3)	626[b]

[a] Estimates were not adjusted for unmarked subbasin or stray hatchery fish. All subbasin hatchery brood returns in 2000 were 100% marked prior to release as smolts, and numbers of unmarked strays are assumed to be low based on the fact that few stray hatchery fish are caught at Powerdale Dam.

[b] Estimate of mean catch rate is for the period 1 May - 15 September.

Table 69. Estimated harvest of subbasin hatchery jack and adult spring chinook salmon in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2000. Confidence limits (95%) are in parenthesis.

Period	Subbasin hatchery adult spring chinook salmon		Subbasin hatchery jack spring chinook salmon		Catch Rate
	Kept	Released	Kept	Released	(hrs/fish)
May 1-15	--	--	9 (12.2)	--	266
May 16-31	--	--	11 (10.5)	--	150
Jun 1-15	--	--	--	--	--
Jun 16-30	--	--	--	--	--
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Aug 1-15	--	--	--	--	--
Aug 16-31	--	--	--	--	--
Sep 1-15	--	--	--	--	--
Total	0	0	20 (16)	0	438[a]

[a] Estimate of mean catch rate is for the period 1 May - 15 September.

Table 70. Estimated harvest of natural jack and adult spring chinook salmon in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2001. Confidence limits (95%) are in parenthesis.

Period	Unmarked adult spring chinook salmon[a]		Unmarked[a] jack spring chinook salmon		Catch Rate
	Kept	Released	Kept	Released	(hrs/fish)
May 16-31	--	--	--	--	--
Jun 1-15	--	4 (5.8)	--	--	452
Jun 16-30	--	--	--	--	--
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Aug 1-15	--	--	--	--	--
Aug 16-31	--	--	--	--	--
Sep 1-15	--	--	--	--	--
Sep 16-30	--	--	--	--	--
Oct 1-15	--	--	--	--	--
Oct 16-31	--	--	--	--	--
Nov 1-15	--	2 (2.8)	--	--	179
Total	0	6 (6.5)	0	0	1,211[b]

[a] Estimates were not adjusted for unmarked subbasin or stray hatchery fish. All subbasin hatchery brood returns in 2001 were 100% marked prior to release as smolts, and numbers of unmarked strays are assumed to be low based on the fact that few stray hatchery fish are caught at Powerdale Dam.

[b] Estimate of mean catch rate is for the period 16 May - 15 November.

Table 71. Estimated harvest of subbasin hatchery jack and adult spring chinook salmon in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2001. Confidence limits (95%) are in parenthesis.

Period	Subbasin hatchery adult spring chinook salmon		Subbasin hatchery jack spring chinook salmon		Catch Rate
	Kept	Released	Kept	Released	(hrs/fish)
May 16-31	4 (7.2)	40 (28.3)	--	--	42
Jun 1-15	16 (12.3)	--	22 (11.9)	--	48
Jun 16-30	3 (4.5)	--	9 (10.0)	--	140
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Aug 1-15	--	--	--	--	--
Aug 16-31	--	--	--	--	--
Sep 1-15	--	--	--	--	--
Sep 16-30	--	--	--	--	--
Oct 1-15	--	--	--	--	--
Oct 16-31	--	--	--	--	--
Nov 1-15	--	--	--	--	--
Total	23 (15)	40 (28)	31 (16)	0	77[a]

[a] Estimate of mean catch rate is for the period 16 May - 15 November.

Table 72. Jack and adult spring chinook salmon escapements to the Powerdale Dam trap; by origin, stock, run year, and age category. Fish of unknown origin were allocated to origin categories based on scale analysis and the ratio of fish of known origin (*see* **METHODS**).

Origin, stock, run year	Total escapement[a]			Freshwater.Total age									
	M	J	A	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6	3.5
Natural,													
Hood River,[b]													
1992	0	0	35	0	1	22	1	0	0	8	3	0	0
1993	1	0	42	0	1	15	10	1	0	8	8	0	0
1994	0	1	33	1	2	14	5	0	0	5	6	1	0
1995	0	0	20	0	4	1	4	0	0	2	9	0	0
1996	1	1	96	1	4	6	0	1	0	84	1	0	1
1997	13	1	72	0	0	6	1	13	1	24	41	0	0
1998	5	1	80	0	11	14	1	5	1	16	37	1	0
1999	1	3	21	0	2	5	3	1	3	9	2	0	0
2000	3	0	66	0	6	3	0	3	0	54	3	0	0
2001	1	3	42	1	6	3	0	1	2	21	12	0	0
Subbasin hatchery,													
Carson,													
1992	0	3	414	--	--	--	--	0	3	396	18	0	--
1993	0	15	446	--	--	--	--	--	15	213	233	0	--
1994	0	0	261	--	--	--	--	--	--	244	17	0	--
1995	0	0	36	--	--	--	--	--	--	--	35	1	--
Deschutes,													
1993	4	0	0	--	--	--	--	4	--	--	--	--	--
1994	0	5	0	--	--	--	--	*c*	5	--	--	--	--
1995	4	0	27	--	--	--	--	4	*c*	27	--	--	--
1996	0	15	2	--	--	--	--	0	15	*c*	2	--	--
1997	11	1	280	--	--	--	--	11	1	280	*c*	--	--
1998	14	2	15	--	--	--	--	14	2	12	3	--	--

Table 72. Continued.

Origin, stock, run year	Total escapement[a] M	J	A	Freshwater.Total age 1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6	3.5
Subbasin hatchery, Deschutes, (cont.)													
1999	182	5	88	--	--	--	--	182	5	88	0	--	--
2000	918	128	20	--	--	--	--	918	128	18	2	--	--
2001	32	496	560	--	--	--	--	32	496	560	0	--	--
Stray hatchery, Unknown,													
1992	0	0	1	--	0	1	0	0	0	0	0	--	--
1993	0	0	2	--	0	2	0	0	0	0	0	--	--
1994	12	0	0	--	0	0	0	12	0	0	0	--	--
1995	0	3	2	--	0	0	0	0	3	1	1	--	--
1996	0	0	16	--	0	2	1	0	0	13	0	--	--
1997	0	0	6	--	0	0	0	0	0	0	6	--	--
1998	0	1	2	--	1	0	0	0	1	1	0	--	--
1999	6	0	1	--	0	0	0	6	0	0	1	--	--
2000	2	1	2	--	0	0	0	2	1	2	0	--	--
2001	52	5	25	--	0	0	0	52	5	21	4	--	--

[a] M = mini-jack salmon, J = jack salmon, and A = adult salmon.

[b] The natural run was developed from Deschutes and Carson stock hatchery production releases.

[c] Hatchery returns in this age category would be progeny of the 1992 brood. No hatchery fish were released into the Hood River subbasin from this brood (*see* **HATCHERY PRODUCTION, Production Releases**).

Table 73. Jack and adult spring chinook salmon escapements to the Powerdale Dam trap; by origin, stock, brood year, and total age. (Percent smolt to adult return is in parentheses. Brood years are bold faced for those years in which brood year specific estimates of escapement are complete. Estimates are based on returns in the 1992-2001 run years.)

Origin, stock, brood year[a]	Smolt production	Total age				
		Age 2	Age 3	Age 4	Age 5	Age 6
Natural,						
Hood River,[b]						
1986	--	--	--	--	--	0
1987	--	--	--	--	4	0
1988	--	--	--	30	18	1
1989	--	--	1	23	11	0
1990	--	0	1	19	13	0
1991	--	1	2	3	2	0
1992	--	1	4	90	42	1
1993	--	0	4	30	38	0
1994	--	2	1	30	5	0
1995	--	13	12	14	3	0
1996	--	5	5	57	12	--
1997	--	1	6	24	--	--
1998	--	3	8	--	--	--
1999	--	2	--	--	--	--
Subbasin hatchery,						
Carson,						
1986	149,939	--	--	--	--	0
1987	134,047	--	--	--	18 (0.01)	0
1988	197,988	--	--	396 (0.20)	233 (0.12)	0
1989	125,432	--	3 (0.002)	213 (0.17)	17 (0.01)	1 (0.001)
1990	163,295	0	15 (0.009)	244 (0.15)	35 (0.02)	0
Deschutes,[c]						
1991	75,205	4 (0.005)	5 (0.007)	27 (0.04)	2 (0.003)	--
1992[d]	0	--	--	--	--	--
1993	170,004	4 (0.002)	15 (0.01)	280 (0.16)	3 (0.002)	--
1994	123,230	0	1 (0.001)	12 (0.01)	0	--
1995	100,719	11 (0.01)	2 (0.002)	88 (0.09)	2 (0.002)	--
1996	123,760	14 (0.01)	5 (0.004)	18 (0.01)	0	--
1997	121,348	182 (0.15)	128 (0.11)	560 (0.46)	--	--
1998	136,926	918 (0.67)	496 (0.36)	--	--	--
1999	124,679	32 (0.03)	--	--	--	--

Table 73. Continued.

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[a] Complete brood returns are available beginning with the 1990 natural and 1989 hatchery broods, as determined based on age structure for jack and adult spring chinook salmon sampled at the Powerdale Dam trap. Estimates of escapement for prior brood years do not include returns from all possible age categories.

[b] The natural run was developed from Deschutes and Carson stock hatchery production releases.

[c] Beginning with the 1994 brood release, hatchery smolts were volitionally released from acclimation facilities located in the Hood River subbasin. Hatchery smolts were held at the facilities for up to two weeks prior to release.

[d] No hatchery fish were released from the 1992 brood (*see* **HATCHERY PRODUCTION, Production Releases**).

Table 74. Age composition (percent) of jack and adult spring chinook salmon sampled at the Powerdale Dam trap; by origin, stock, run year, and total age. Estimates in a given run year may not add to 100% due to rounding error.

Origin, stock, run year	N	Freshwater.Total age 1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6
Natural,										
Hood River,[a]										
1992	34	0	2.9	61.8	2.9	0	0	23.5	8.8	0
1993	41	0	2.4	36.6	24.4	2.4	0	14.6	19.5	0
1994	33	3.0	6.1	42.4	15.2	0	0	15.2	15.2	3.0
1995	18	0	16.7	5.6	16.7	0	0	11.1	50.0	0
1996	90	0	4.4	6.7	0	1.1	0	86.7	1.1	0
1997	72	0	0	8.3	1.4	5.6	1.4	29.2	54.2	0
1998	82	0	13.4	15.9	1.2	6.1	1.2	18.3	42.7	1.2
1999	24	0	8.3	20.8	12.5	4.2	12.5	33.3	8.3	0
2000	67	0	9.0	4.5	0	4.5	0	77.6	4.5	0
2001	42	2.4	14.3	7.1	0	2.4	2.4	45.2	26.2	0
Subbasin hatchery,										
Carson,										
1992	397	--	--	--	--	0	0.8	95.0	4.3	0
1993	455	--	--	--	--	--	3.3	46.2	50.5	0
1994	258	--	--	--	--	--	--	93.8	6.2	0
1995	33	--	--	--	--	--	--	--	97.0	3.0
Deschutes,										
1993	1	--	--	--	--	100	--	--	--	--
1994	5	--	--	--	--	*b*	100	--	--	--
1995	25	--	--	--	--	16.0	*b*	84.0	--	--

Table 74. Continued.

Origin, stock, run year	N	Freshwater.Total age 1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6
Subbasin hatchery, Deschutes, (cont.)										
1996	15	--	--	--	--	0	100	*b*	0	--
1997	275	--	--	--	--	2.2	0	97.8	*b*	--
1998	29	--	--	--	--	48.3	3.4	37.9	10.3	--
1999	264	--	--	--	--	67.0	1.9	31.1	0	--
2000	1,062	--	--	--	--	86.1	12.1	1.7	0.2	--
2001	1,082	--	--	--	--	3.0	45.6	51.5	0	--
Stray hatchery, Unknown,										
1992	1	--	0	100	0	0	0	0	0	--
1993	2	--	0	100	0	0	0	0	0	--
1994	10	--	0	0	0	100	0	0	0	--
1995	3	--	0	0	0	0	33.3	33.3	33.3	--
1996	1	--	0	0	0	0	0	100	0	--
1998	2	--	0	0	0	0	50.0	50.0	0	--
1999	7	--	0	0	0	85.7	0	0	14.3	--
2000	5	--	0	0	0	40.0	20.0	40.0	0	--
2001	13	--	0	0	0	7.7	7.7	61.5	23.1	--

[a] The natural run was developed from Deschutes and Carson stock hatchery production releases.

[b] Hatchery returns in this age class would be progeny of the 1992 brood. No hatchery fish were released into the Hood River subbasin from this brood (*see* **HATCHERY PRODUCTION, Production Releases**).

Table 75. Mean fork length (cm) of jack and adult spring chinook salmon; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 2000 run year of spring chinook salmon escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop., statistic	Freshwater.Total age 1.3	1.4	2.2	2.3	2.4	2.5	Sample mean
Natural,							
Hood River,							
Females,							
N	--	2	--	--	26	3	31
Mean	--	78.75	--	--	73.21	82.17	74.44
STD	--	1.06	--	--	4.33	2.75	4.97
Range	--	78.0-79.5	--	--	66.0-84.0	79.0-84.0	66.0-84.0
Males,							
N	6	1	3	--	26	--	36
Mean	56.58	81.0	28.17	--	75.42	--	68.50
STD	4.69	--	3.91	--	5.53	--	15.16
Range	48.0-61.0	81.0	23.7-31.0	--	61.5-90.5	--	23.7-90.5
Totals,							
N	6	3	3	--	52	3	67
Mean	56.58	79.50	28.17	--	74.32	82.17	71.25
STD	4.69	1.50	3.91	--	5.04	2.75	11.91
Range	48.0-61.0	78.0-81.0	23.7-31.0	--	61.5-90.5	79.0-84.0	23.7-90.5
Subbasin hatchery,							
Deschutes,							
Females,							
N	--	--	1	19	15	1	36
Mean	--	--	47.0	55.39	70.63	88.5	62.43
STD	--	--	--	3.57	4.31	--	9.79
Range	--	--	47.0	48.5-63.0	64.0-81.0	88.5	47.0-88.5
Males,							
N	--	--	913	108	3	1	1,025
Mean	--	--	27.35	50.98	73.00	83.5	30.03
STD	--	--	2.94	4.26	4.36	--	8.40
Range	--	--	18.5-38.5	37.0-62.0	68.0-76.0	83.5	18.5-83.5
Totals,							
N	--	--	914	127	18	2	1,061
Mean	--	--	27.37	51.64	71.03	86.00	31.13
STD	--	--	3.00	4.45	4.29	3.54	10.28
Range	--	--	18.5-47.0	37.0-63.0	64.0-81.0	83.5-88.5	18.5-88.5

Table 76. Mean fork length (cm) of jack and adult spring chinook salmon; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 2001 run year of spring chinook salmon escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop.,	Freshwater.Total age							Sample
statistic	1.2	1.3	1.4	2.2	2.3	2.4	2.5	mean
Natural,								
Hood River,								
Females,								
N	--	--	--	--	--	14	6	20
Mean	--	--	--	--	--	75.68	90.67	80.18
STD	--	--	--	--	--	5.61	4.46	8.74
Range	--	--	--	--	--	70.0-88.0	86.0-97.0	70.0-97.0
Males,								
N	1	6	3	1	1	5	5	22
Mean	33.5	57.58	76.33	33.5	47.5	77.10	92.10	69.77
STD	--	8.11	4.62	--	--	4.05	9.61	19.17
Range	33.5	49.5-71.0	71.0-79.0	33.5	47.5	71.0-81.5	84.0-108.0	33.5-108.0
Totals,								
N	1	6	3	1	1	19	11	42
Mean	33.5	57.58	76.33	33.5	47.5	76.05	91.32	74.73
STD	--	8.11	4.62	--	--	5.18	6.89	15.85
Range	33.5	49.5-71.0	71.0-79.0	33.5	47.5	70.0-88.0	84.0-108.0	33.5-108.0
Subbasin hatchery,								
Deschutes,								
Females,								
N	--	--	--	--	38	451	--	489
Mean	--	--	--	--	57.29	73.18	--	71.95
STD	--	--	--	--	5.84	3.86	--	5.87
Range	--	--	--	--	47.5-70.5	60.0-84.0	--	47.5-84.0
Males,								
N	--	--	--	32	455	106	--	593
Mean	--	--	--	25.66	54.34	74.14	--	56.33
STD	--	--	--	1.94	4.32	5.01	--	11.39
Range	--	--	--	20.5-29.0	39.0-66.0	56.0-83.0	--	20.5-83.0
Totals,								
N	--	--	--	32	493	557	--	1,082
Mean	--	--	--	25.66	54.57	73.36	--	63.39
STD	--	--	--	1.94	4.52	4.11	--	12.12
Range	--	--	--	20.5-29.0	39.0-70.5	56.0-84.0	--	20.5-84.0

Table 77. Mean fork length (cm) of jack and adult spring chinook salmon; by origin, stock, brood year, and age category. [Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables and in Olsen et al. (1995), Olsen et al. (1996), Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).]

Origin, stock, brood year	Freshwater.Total age								
	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6
Natural,									
Hood River,[a]									
1987	--	--	--	86 (1)	--	--	--	85 (3)	--
1988	--	--	81 (21)	91 (10)	--	--	72 (8)	88 (8)	92 (1)
1989	--	71 (1)	82 (15)	96 (5)	--	--	87 (6)	79 (5)	--
1990	--	78 (1)	77 (14)	92 (3)	--	--	72 (5)	95 (9)	--
1991	--	62 (2)	80 (1)	--	66 (1)	--	72 (2)	84 (1)	--
1992	30 (1)	68 (3)	82 (6)	87 (1)	--	--	77 (78)	92 (39)	98 (1)
1993	--	62 (4)	87 (6)	85 (1)	--	--	78 (21)	86 (35)	--
1994	--	--	77 (13)	80 (3)	32 (1)	38 (1)	85 (15)	84 (2)	--
1995	--	61 (11)	77 (5)	--	31 (4)	60 (1)	71 (8)	82 (3)	--
1996	--	56 (2)	80 (3)	--	29 (5)	49 (3)	74 (52)	91 (11)	--
1997	--	57 (6)	76 (3)	--	18 (1)	--	76 (19)	--	--
1998	--	58 (6)	--	--	28 (3)	48 (1)	--	--	--
1999	34 (1)	--	--	--	34 (1)	--	--	--	--
Subbasin hatchery,									
Carson,									
1987	--	--	--	--	--	--	--	89 (17)	--
1988	--	--	--	--	--	--	74 (377)	89 (230)	--
1989	--	--	--	--	--	56 (3)	83 (210)	82 (16)	85 (1)
1990	--	--	--	--	--	52 (15)	75 (242)	92 (32)	--
Deschutes,									
1991	--	--	--	--	28 (1)	52 (5)	75 (21)	--	--
1992[b]	--	--	--	--	--	--	--	--	--

Table 77. Continued.

Origin, stock, brood year	Freshwater.Total age								
	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6
Subbasin hatchery, Deschutes, (cont.)									
1993	--	--	--	--	26 (4)	52 (15)	76 (269)	89 (3)	--
1994	--	--	--	--	--	--	72 (11)	--	--
1995	--	--	--	--	24 (6)	56 (1)	72 (82)	86 (2)	--
1996	--	--	--	--	27 (14)	53 (5)	71 (18)	--	--
1997	--	--	--	--	27 (177)	52 (127)	73 (557)	--	--
1998	--	--	--	--	27 (914)	55 (493)	--	--	--
1999	--	--	--	--	26 (32)	--	--	--	--
Stray hatchery, Unknown,									
1988	--	--	67 (1)	--	--	--	--	--	--
1989	--	--	78 (2)	--	--	--	--	--	--
1990	--	--	--	--	--	--	--	93 (1)	--
1991	--	--	--	--	--	--	82 (1)	--	--
1992	--	--	--	--	33 (10)	52 (1)	82 (1)	--	--
1994	--	--	--	--	--	--	82 (1)	69 (1)	--
1995	--	--	--	--	--	50 (1)	--	--	--
1996	--	--	--	--	--	--	55 (2)	71 (3)	--
1997	--	--	--	--	27 (6)	52 (1)	62 (8)	--	--
1998	--	--	--	--	26 (2)	60 (1)	--	--	--
1999	--	--	--	--	26 (1)	--	--	--	--

[a] The natural run was developed from Deschutes and Carson stock hatchery production releases.

[b] No hatchery fish were released from the 1992 brood (*see* **HATCHERY PRODUCTION, Production Releases**).

Table 78. Mean weight (kg) of jack and adult spring chinook salmon; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 2000 run year of spring chinook salmon escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop., statistic	Freshwater.Total age 1.3	1.4	2.2	2.3	2.4	2.5	Sample mean
Natural,							
Hood River,							
Females,							
N	--	2	--	--	26	3	31
Mean	--	6.85	--	--	4.73	6.13	5.00
STD	--	0.78	--	--	0.86	0.15	1.03
Range	--	6.3-7.4	--	--	2.9-6.6	6.0-6.3	2.9-7.4
Males,							
N	6	1	--	--	26	--	33
Mean	2.37	7.1	--	--	5.23	--	4.77
STD	0.50	--	--	--	1.30	--	1.67
Range	1.5-2.9	7.1	--	--	2.8-8.2	--	1.5-8.2
Totals,							
N	6	3	--	--	52	3	64
Mean	2.37	6.93	--	--	4.98	6.13	4.88
STD	0.50	0.57	--	--	1.12	0.15	1.39
Range	1.5-2.9	6.3-7.4	--	--	2.8-8.2	6.0-6.3	1.5-8.2
Subbasin hatchery,							
Deschutes,							
Females,							
N	--	--	1	19	15	1	36
Mean	--	--	1.2	2.27	4.35	7.6	3.26
STD	--	--	--	0.46	0.79	--	1.43
Range	--	--	1.2	1.4-3.1	3.1-6.5	7.6	1.2-7.6
Males,							
N	--	--	2	109	3	1	115
Mean	--	--	0.4	1.82	4.63	5.9	1.90
STD	--	--	0	0.46	0.97	--	0.78
Range	--	--	0.4	0.7-3.0	3.8-5.7	5.9	0.2-5.9
Totals,							
N	--	--	3	128	18	2	151
Mean	--	--	0.53	1.89	4.39	6.75	2.22
STD	--	--	0.58	0.48	0.80	1.20	1.13
Range	--	--	0.2-1.2	0.7-3.1	3.1-6.5	5.9-7.6	0.2-7.6

Table 79. Mean weight (kg) of jack and adult spring chinook salmon; by origin, stock, sample population (i.e., sex), and age category. Fish were sampled from the 2001 run year of spring chinook salmon escaping to the adult trap located at Powerdale Dam.

Origin, stock, sample pop.,	Freshwater.Total age							Sample
statistic	1.2	1.3	1.4	2.2	2.3	2.4	2.5	mean
Natural,								
Hood River,								
Females,								
N	--	--	--	--	--	14	6	20
Mean	--	--	--	--	--	4.92	8.90	6.12
STD	--	--	--	--	--	1.04	1.72	2.24
Range	--	--	--	--	--	3.5-6.9	6.8-11.1	3.5-11.1
Males,								
N	--	6	3	--	1	5	5	20
Mean	--	2.25	5.37	--	1.2	5.02	8.68	4.96
STD	--	0.82	1.40	--	--	0.97	2.66	2.97
Range	--	1.4-3.5	4.0-6.8	--	1.2	3.5-6.0	6.7-13.2	1.2-13.2
Totals,								
N	--	6	3	--	1	19	11	40
Mean	--	2.25	5.37	--	1.2	4.95	8.80	5.54
STD	--	0.82	1.40	--	--	0.99	2.08	2.66
Range	--	1.4-3.5	4.0-6.8	--	1.2	3.5-6.9	6.7-13.2	1.2-13.2
Subbasin hatchery,								
Deschutes,								
Females,								
N	--	--	--	--	38	451	--	489
Mean	--	--	--	--	2.46	4.70	--	4.53
STD	--	--	--	--	0.74	0.80	--	0.99
Range	--	--	--	--	1.2-4.2	2.2-7.7	--	1.2-7.7
Males,								
N	--	--	--	1	454	106	--	561
Mean	--	--	--	0.1	2.10	4.86	--	2.62
STD	--	--	--	--	1.10	1.02	--	1.53
Range	--	--	--	0.1	0.7-23.0	1.9-7.4	--	0.1-23.0
Totals,								
N	--	--	--	1	492	557	--	1,050
Mean	--	--	--	0.1	2.13	4.73	--	3.50
STD	--	--	--	--	1.08	0.85	--	1.62
Range	--	--	--	0.1	0.7-23.0	1.9-7.7	--	0.1-23.0

Table 80. Mean weight (kg) of jack and adult spring chinook salmon; by origin, stock, brood year, and age category. [Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables and in Olsen et al. (1995), Olsen et al. (1996), Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).]

Origin, stock, brood year	Freshwater.Total age								
	1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6
Natural,									
Hood River,[a]									
1987	--	--	--	--	--	--	--	--	--
1988	--	--	--	--	--	--	--	--	9.5 (1)
1989	--	--	--	10.1 (5)	--	--	--	6.2 (5)	--
1990	--	--	5.4 (13)	9.4 (3)	--	--	4.9 (5)	9.3 (9)	--
1991	--	2.9 (2)	5.7 (1)	--	--	--	4.6 (2)	7.7 (1)	--
1992	0.3 (1)	4.2 (3)	6.5 (6)	8.1 (1)	--	--	5.4 (78)	8.8 (39)	11.7 (1)
1993	--	2.9 (4)	7.6 (6)	8.5 (1)	--	--	5.7 (21)	7.9 (35)	--
1994	--	--	5.9 (13)	6.9 (3)	0.5 (1)	0.7 (1)	7.2 (15)	7.0 (2)	--
1995	--	3.0 (10)	6.1 (5)	--	--	2.5 (1)	4.2 (8)	6.1 (3)	--
1996	--	2.2 (2)	6.9 (3)	--	--	1.5 (3)	5.0 (52)	8.8 (11)	--
1997	--	2.4 (6)	5.4 (3)	--	--	--	4.9 (19)	--	--
1998	--	2.2 (6)	--	--	--	1.2 (1)	--	--	--
1999	--	--	--	--	--	--	--	--	--
Subbasin hatchery,									
Carson,									
1987	--	--	--	--	--	--	--	--	--
1988	--	--	--	--	--	--	--	--	--
1989	--	--	--	--	--	--	--	6.7 (16)	7.4 (1)
1990	--	--	--	--	--	--	5.3 (235)	8.5 (30)	--
Deschutes,									
1991	--	--	--	--	--	1.6 (5)	4.9 (19)	--	--
1992[b]	--	--	--	--	--	--	--	--	--

Table 80. Continued.

Origin, stock, brood year	Freshwater.Total age 1.2	1.3	1.4	1.5	2.2	2.3	2.4	2.5	2.6
Subbasin hatchery, Deschutes, (cont.)									
1993	--	--	--	--	0.3 (1)	1.9 (14)	5.1 (263)	8.7 (3)	--
1994	--	--	--	--	--	--	4.4 (11)	--	--
1995	--	--	--	--	1.2 (1)	2.1 (1)	4.3 (79)	6.8 (2)	--
1996	--	--	--	--	--	1.9 (5)	4.4 (18)	--	--
1997	--	--	--	--	0.2 (16)	1.9 (128)	4.7 (557)	--	--
1998	--	--	--	--	0.5 (3)	2.1 (492)	--	--	--
1999	--	--	--	--	0.1 (1)	--	--	--	--
Stray hatchery, Unknown,									
1988	--	--	--	--	--	--	--	--	--
1989	--	--	--	--	--	--	--	--	--
1990	--	--	--	--	--	--	--	10.1 (1)	--
1991	--	--	--	--	--	--	7.8 (1)	--	--
1992	--	--	--	--	0.4 (1)	1.7 (1)	6.0 (1)	--	--
1994	--	--	--	--	--	--	8.3 (1)	3.9 (1)	--
1995	--	--	--	--	--	1.5 (1)	--	--	--
1996	--	--	--	--	--	--	2.2 (2)	4.4 (3)	--
1997	--	--	--	--	0.3 (6)	1.9 (1)	3.0 (8)	--	--
1998	--	--	--	--	--	2.7 (1)	--	--	--
1999	--	--	--	--	--	--	--	--	--

[a] The natural run was developed from Deschutes and Carson stock hatchery production releases.

[b] No hatchery fish were released from the 1992 brood (*see* **HATCHERY PRODUCTION, Production Releases**).

Table 81. Jack and adult spring chinook salmon sex ratios as a percentage of females; by origin, stock, run year, and age category. Fish were sampled at the Powerdale Dam trap. (Sample size is in parentheses.)

Origin, stock, run year	Freshwater.Total age								
	1.2	1.3	1.4	1.5	2.2[a]	2.3[b]	2.4	2.5	2.6
Natural,									
Hood River,[c]									
1992	--	0 (1)	67 (21)	100 (1)	--	--	25 (8)	67 (3)	--
1993	--	0 (1)	73 (15)	80 (10)	0 (1)	--	67 (6)	50 (8)	--
1994	0 (1)	0 (2)	36 (14)	60 (5)	--	--	60 (5)	40 (5)	100 (1)
1995	--	100 (3)[c]	0 (1)	67 (3)	--	--	100 (2)	67 (9)	--
1996	--	50 (4)[c]	50 (6)	--	0 (1)	--	63 (78)	100 (1)	--
1997	--	--	50 (6)	100 (1)	0 (4)	0 (1)	67 (21)	54 (39)	--
1998	--	0 (11)	31 (13)	0 (1)	0 (5)	0 (1)	47 (15)	71 (35)	100 (1)
1999	--	0 (2)	60 (5)	67 (3)	0 (1)	33 (3)	62 (8)	50 (2)	--
2000	--	0 (6)	67 (3)	--	0 (3)	--	50 (52)	100 (3)	--
2001	0 (1)	0 (6)	0 (3)	--	0 (1)	0 (1)	74 (19)	55 (11)	--
Subbasin hatchery,									
Carson,									
1992	--	--	--	--	--	0 (3)	75 (375)	71 (17)	--
1993	--	--	--	--	--	47 (15)	71 (209)	61 (227)	--
1994	--	--	--	--	--	--	64 (242)	62 (16)	--
1995	--	--	--	--	--	--	--	66 (32)	0 (1)
Deschutes,									
1993	--	--	--	--	0 (1)	--	--	--	--
1994	--	--	--	--	*d*	40 (5)	--	--	--
1995	--	--	--	--	0 (4)	*d*	81 (21)	--	--
1996	--	--	--	--	--	7 (14)	*d*	--	--
1997	--	--	--	--	0 (6)	--	68 (269)	*d*	--
1998	--	--	--	--	0 (14)	0 (1)	73 (11)	67 (3)	--

Table 81. Continued.

Origin, stock, run year	Freshwater.Total age 1.2	1.3	1.4	1.5	2.2[a]	2.3[b]	2.4	2.5	2.6
Subbasin hatchery, Deschutes, (cont.)									
1999	--	--	--	--	0 (177)	20 (5)	59 (82)	--	--
2000	--	--	--	--	0 (914)	15 (128)	83 (18)	50 (2)	--
2001	--	--	--	--	0 (32)	8 (493)	81 (557)	--	--
Stray hatchery, Unknown,									
1992	--	--	100 (1)	--	--	--	--	--	--
1993	--	--	100 (2)	--	--	--	--	--	--
1994	--	--	--	--	0 (10)	--	--	--	--
1995	--	--	--	--	--	0 (1)	100 (1)	0 (1)	--
1996	--	--	--	--	--	--	0 (1)	--	--
1998	--	--	--	--	--	0 (1)	0 (1)	--	--
1999	--	--	--	--	0 (6)	--	--	100 (1)	--
2000	--	--	--	--	0 (2)	0 (1)	0 (2)	--	--
2001	--	--	--	--	0 (1)	0 (1)	38 (8)	100 (3)	--

[a] Mini-jacks were either visually identified as males, or assumed to be males, unless otherwise noted by the sampler.

[b] Except in a few instances, jacks were classified as females based on visual observation.

[c] The natural run was developed from Deschutes and Carson stock hatchery production releases.

[d] Hatchery returns in this age class would be progeny of the 1992 brood. No hatchery fish were released into the Hood River subbasin from this brood (*see* **HATCHERY PRODUCTION, Production Releases**).

Table 82. Bi-weekly counts of upstream migrant jack and adult fall chinook salmon captured at the Powerdale Dam trap; by origin and run year. Counts are boldfaced for the bi-weekly period in which the median date of migration occurred in each origin category.

Origin,	July		August		September		October		November		December		
run year	01-15	16-31	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-30	01-15	16-31	Total
Natural,													
1992	0	0	4	1	2	**7**	1	1	0	0	0	0	16
1993	0	0	**3**	1	2	0	0	0	0	0	0	0	6
1994[a]	0	6	2	0	0	**13**	3	1	0	0	0	0	25
1995[b]	0	**4**	0	1	3	0	0	0	0	0	0	0	8
1996	1	1	0	**7**	3	0	0	1	0	0	0	0	13
1997	0	4	7	**2**	9	2	0	0	0	0	0	0	24
1998	0	0	9	3	**9**	9	4	0	0	0	0	0	34
1999	0	0	3	4	**3**	1	3	1	1	0	0	0	16
2000	2	2	2	2	**13**	10	1	0	0	0	0	0	32
2001	2	3	3	5	**3**	3	9	1	0	0	0	0	29
Stray hatchery,													
1992	0	0	0	0	2	**1**	2	0	0	0	0	0	5
1993	0	0	0	0	**2**	1	1	0	0	0	0	0	4
1994[a]	0	0	0	0	0	**6**	0	0	0	0	0	0	6
1995[b]	0	0	0	0	**2**	2	0	0	0	0	0	0	4
1996	0	0	0	0	**1**	0	1	0	0	0	0	0	2
1997	0	0	0	0	**2**	0	0	0	0	0	0	0	2
1998	0	0	0	0	1	**1**	2	0	0	0	0	0	4
1999	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	0	0	0	0	0	**2**	0	0	0	0	0	0	2
2001	1	2	**2**	0	1	0	2	1	1	0	0	0	10

Table 82. Continued.

Origin, run year	July 01-15	July 16-31	August 01-15	August 16-31	September 01-15	September 16-30	October 01-15	October 16-31	November 01-15	November 16-30	December 01-15	December 16-31	Total
Unknown,													
1992	0	0	0	0	0	0	0	**1**	0	0	0	0	1
1993	0	0	0	0	0	0	0	0	0	0	0	0	0
1994[a]	0	0	0	0	0	3	**3**	1	1	0	0	0	8
1995[b]	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	0	0	0	0	**1**	0	0	0	0	0	0	0	1
1997	0	0	1	0	**2**	0	1	0	0	0	0	0	4
1998	0	0	0	0	0	**2**	0	0	0	0	0	0	2
1999	0	0	0	1	0	0	**1**	0	1	0	0	0	3
2000	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	0	0	0	0	0	0	0	0	0	0	0	0	0

[a] Trap was inoperable from 10/27-11/07/94 because of flood damage.

[b] Powerdale Dam trap was inoperative from 11-13 Nov 1995 and from 20-24 Nov 1995 because of flood damage and from 28 Nov 1995 through 27 Feb 1996 for modifications to the adult fish ladder.

Table 83. Estimated harvest of unmarked and stray hatchery jack and adult fall chinook salmon in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2000. Estimates of harvest are combined for jack and adult fish. Confidence limits (95%) are in parenthesis.

	Unmarked fall chinook salmon		Stray fall chinook salmon		Catch Rate
Period	Kept	Released	Kept	Released	(hrs/fish)
Oct 1-15	--	--	--	--	--
Oct 16-31	--	--	--	--	--
Nov 1-15	--	--	--	--	--
Nov 16-30	--	--	--	--	--
Dec 1-15	--	--	--	--	--
Dec 16-31	--	--	--	--	--
Total	0	0	0	0	0

Table 84. Estimated harvest of unmarked and stray hatchery jack and adult fall chinook salmon in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2001. Estimates of harvest are combined for jack and adult fish. Confidence limits (95%) are in parenthesis.

	Unmarked fall chinook salmon		Stray fall chinook salmon		Catch Rate
Period	Kept	Released	Kept	Released	(hrs/fish)
Oct 1-15	--	--	--	--	--
Oct 16-31	--	--	--	--	--
Nov 1-15	--	2 (3.9)	--	--	179
Nov 16-30	--	--	--	--	--
Dec 1-15	--	--	--	--	--
Dec 16-31	--	--	--	--	--
Total	0	2 (3.9)	0	0	179[a]

[a] Estimate of mean catch rate is for the period 1 November - 15 November.

Table 85. Jack and adult fall chinook salmon escapements to the Powerdale Dam trap; by origin, run year, and age category. Fish of unknown origin were allocated to origin categories based on scale analysis, size, and the ratio of fish of known origin (*see* **METHODS**).

Origin, run year	Total escapement	Freshwater.Total age							
		1.2	1.3	1.4	1.5	1.6	2.3	2.4	2.5
Natural,									
1992	16	2	2	10	1	1	0	0	0
1993	6	0	1	3	2	0	0	0	0
1994	31	2	4	18	2	0	1	2	2
1995	8	1	0	1	1	0	1	2	2
1996	14	0	1	10	0	0	1	2	0
1997	28	0	7	9	0	0	2	7	3
1998	36	4	11	4	10	0	0	4	3
1999	19	1	5	4	1	0	0	6	2
2000	32	1	10	12	5	0	1	3	0
2001	29	1	11	14	0	0	0	3	0
Stray hatchery,									
1992	6	1	3	2	0	--	0	0	0
1993	4	0	1	2	1	--	0	0	0
1994	8	0	1	5	0	--	0	2	0
1995	4	0	0	1	0	--	0	3	0
1996	2	0	0	0	0	--	1	1	0
1997	2	0	0	1	0	--	0	1	0
1998	4	0	1	1	1	--	0	1	0
1999	0	0	0	0	0	--	0	0	0
2000	2	0	1	1	0	--	0	0	0
2001	10	0	3	1	0	--	0	6	0

Table 86. Age composition (percent) of jack and adult fall chinook salmon sampled at the Powerdale Dam trap; by origin, run year, and age category. Estimates in a given run year may not add to 100% due to rounding error.

Origin, run year	N	Freshwater.Total age 1.2	1.3	1.4	1.5	1.6	2.3	2.4	2.5
Natural,									
1992	16	12.5	12.5	62.5	6.2	6.2	--	--	--
1993	6	--	16.7	50.0	33.3	--	--	--	--
1994	25	8.0	16.0	48.0	8.0	--	4.0	8.0	8.0
1995	8	12.5	--	12.5	12.5	--	12.5	25.0	25.0
1996	13	--	7.7	69.2	--	--	7.7	15.4	--
1997	24	--	25.0	29.2	--	--	8.3	25.0	12.5
1998	34	11.8	29.4	11.8	26.5	--	--	11.8	8.8
1999	16	6.2	25.0	18.8	6.2	--	--	31.2	12.5
2000	32	3.1	31.2	37.5	15.6	--	3.1	9.4	--
2001	29	3.4	37.9	48.3	--	--	--	10.3	--
Stray hatchery,									
1992	5	20.0	40.0	40.0	--	--	--	--	--
1993	4	--	25.0	50.0	25.0	--	--	--	--
1994	6	--	--	66.7	--	--	--	33.3	--
1995	4	--	--	25.0	--	--	--	75.0	--
1996	2	--	--	--	--	--	50.0	50.0	--
1997	2	--	--	50.0	--	--	--	50.0	--
1998	4	--	25.0	25.0	25.0	--	--	25.0	--
2000	2	--	50.0	50.0	--	--	--	--	--
2001	10	--	30.0	10.0	--	--	--	60.0	--

Table 87. Mean fork length (cm) of jack and adult fall chinook salmon; by origin, sample population (i.e., sex), and age category. Fish were sampled from the 2000 run year of fall chinook salmon escaping to the adult trap located at Powerdale Dam.

Origin, sample pop., statistic	Freshwater.Total age 1.2	1.3	1.4	1.5	2.3	2.4	Sample mean
Natural,							
Females,							
N	1	8	7	5	1	3	25
Mean	46.0	75.25	80.79	89.00	77.5	75.67	78.52
STD	--	4.68	5.69	5.09	--	3.21	9.63
Range	46.0	70.0-84.0	72.5-90.5	81.5-95.5	77.5	72.0-78.0	46.0-95.5
Males,							
N	--	2	5	--	--	--	7
Mean	--	77.75	88.90	--	--	--	85.71
STD	--	8.13	6.41	--	--	--	8.25
Range	--	72.0-83.5	80.0-96.0	--	--	--	72.0-96.0
Totals,							
N	1	10	12	5	1	3	32
Mean	46.0	75.75	84.17	89.00	77.5	75.67	80.09
STD	--	5.05	7.07	5.09	--	3.21	9.70
Range	46.0	70.0-84.0	72.5-96.0	81.5-95.5	77.5	72.0-78.0	46.0-96.0

Table 88. Mean fork length (cm) of jack and adult fall chinook salmon; by origin, sample population (i.e., sex), and age category. Fish were sampled from the 2001 run year of fall chinook salmon escaping to the adult trap located at Powerdale Dam.

Origin, sample pop., statistic	Freshwater.Total age 1.2	1.3	1.4	2.4	Sample mean
Natural,					
Females,					
N	--	6	13	3	22
Mean	--	69.42	85.04	79.00	79.95
STD	--	7.90	3.77	4.00	8.51
Range	--	58.0-82.0	76.5-90.0	75.0-83.0	58.0-90.0
Males,					
N	1	5	1	--	7
Mean	42.5	71.60	96.0	--	70.93
STD	--	10.16	--	--	17.57
Range	42.5	56.0-84.0	96.0	--	42.5-96.0
Totals,					
N	1	11	14	3	29
Mean	42.5	70.41	85.82	79.00	77.78
STD	--	8.59	4.66	4.00	11.66
Range	42.5	56.0-84.0	76.5-96.0	75.0-83.0	42.5-96.0

Table 89. Mean fork length (cm) of jack and adult fall chinook salmon; by origin, brood year, and age category. [Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables and in Olsen et al. (1996), Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).]

Origin, brood year	Freshwater.Total age 1.2	1.3	1.4	1.5	1.6	2.3	2.4	2.5
Natural,								
1986	--	--	--	--	86 (1)	--	--	--
1987	--	--	--	96 (1)	--	--	--	--
1988	--	--	83 (10)	90 (2)	--	--	--	--
1989	--	66 (2)	79 (3)	91 (2)	--	--	--	83 (2)
1990	42 (2)	52 (1)	82 (12)	89 (1)	--	--	82 (2)	90 (2)
1991	--	68 (4)	89 (1)	--	--	57 (1)	79 (2)	--
1992	53 (2)	--	82 (9)	--	--	62 (1)	81 (2)	84 (3)
1993	47 (1)	62 (1)	90 (7)	88 (9)	--	68 (1)	89 (6)	78 (3)
1994	--	78 (6)	83 (4)	101 (1)	--	76 (2)	85 (4)	88 (2)
1995	--	61 (10)	73 (3)	89 (5)	--	--	73 (5)	--
1996	47 (4)	64 (4)	84 (12)	--	--	--	76 (3)	--
1997	38 (1)	76 (10)	86 (14)	--	--	78 (1)	79 (3)	--
1998	46 (1)	70 (11)	--	--	--	--	--	--
1999	42 (1)	--	--	--	--	--	--	--
Stray hatchery,								
1988	--	--	78 (2)	76 (1)	--	--	--	--
1989	--	64 (2)	71 (2)	--	--	--	--	--
1990	44 (1)	70 (1)	80 (4)	--	--	--	78 (2)	--
1991	--	--	72 (1)	--	--	--	78 (3)	--
1992	--	--	--	--	--	--	82 (1)	--
1993	--	--	86 (1)	84 (1)	--	60 (1)	69 (1)	--
1994	--	--	82 (1)	--	--	--	88 (1)	--
1995	--	68 (1)	--	--	--	--	--	--
1996	--	--	78 (1)	--	--	--	--	--
1997	--	65 (1)	80 (1)	--	--	--	78 (6)	--
1998	--	62 (3)	--	--	--	--	--	--

Table 90. Mean weight (kg) of jack and adult fall chinook salmon; by origin, sample population (i.e., sex), and age category. Fish were sampled from the 2000 run year of fall chinook salmon escaping to the adult trap located at Powerdale Dam.

Origin, sample pop., statistic	Freshwater.Total age 1.2	1.3	1.4	1.5	2.3	2.4	Sample mean
Natural,							
Females,							
N	1	8	7	5	1	3	25
Mean	1.2	6.00	6.83	9.42	5.8	6.03	6.72
STD	--	1.25	1.25	1.76	--	1.05	2.12
Range	1.2	4.6-8.4	5.0-9.0	6.8-11.5	5.8	5.0-7.1	1.2-11.5
Males,							
N	--	2	5	--	--	--	7
Mean	--	6.10	9.56	--	--	--	8.57
STD	--	1.98	2.25	--	--	--	2.62
Range	--	4.7-7.5	6.2-12.0	--	--	--	4.7-12.0
Totals,							
N	1	10	12	5	1	3	32
Mean	1.2	6.02	7.97	9.42	5.8	6.03	7.12
STD	--	1.28	2.16	1.76	--	1.05	2.33
Range	1.2	4.6-8.4	5.0-12.0	6.8-11.5	5.8	5.0-7.1	1.2-12.0

Table 91. Mean weight (kg) of jack and adult fall chinook salmon; by origin, sample population (i.e., sex), and age category. Fish were sampled from the 2001 run year of fall chinook salmon escaping to the adult trap located at Powerdale Dam.

Origin, sample pop., statistic	Freshwater.Total age 1.2	1.3	1.4	2.4	Sample mean
Natural,					
Females,					
N	--	6	13	3	22
Mean	--	4.35	8.18	6.60	6.92
STD	--	1.61	1.12	1.06	2.08
Range	--	2.3-7.0	5.9-9.5	5.8-7.8	2.3-9.5
Males,					
N	1	5	1	--	7
Mean	1.1	4.66	12.6	--	5.29
STD	--	1.93	--	--	3.83
Range	1.1	2.4-7.7	12.6	--	1.1-12.6
Totals,					
N	1	11	14	3	29
Mean	1.1	4.49	8.49	6.60	6.52
STD	--	1.68	1.60	1.06	2.62
Range	1.1	2.3-7.7	5.9-12.6	5.8-7.8	1.1-12.6

Table 92. Mean weight (kg) of jack and adult fall chinook salmon; by origin, brood year, and age category. [Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables and in Olsen et al. (1996), Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).]

Origin, brood year	Freshwater.Total age 1.2	1.3	1.4	1.5	1.6	2.3	2.4	2.5
Natural,								
1989	--	--	--	9.5 (2)	--	--	--	7.4 (2)
1990	--	--	7.0 (12)	9.1 (1)	--	--	6.8 (2)	9.7 (2)
1991	--	4.2 (4)	8.9 (1)	--	--	2.5 (1)	5.9 (2)	--
1992	2.0 (2)	--	7.1 (9)	--	--	2.9 (1)	5.8 (2)	7.7 (3)
1993	1.4 (1)	3.2 (1)	8.7 (7)	8.4 (9)	--	3.7 (1)	8.3 (6)	6.4 (3)
1994	--	5.8 (6)	7.8 (4)	11.2 (1)	--	4.9 (2)	7.2 (4)	8.3 (2)
1995	--	5.2 (10)	5.9 (3)	9.4 (5)	--	--	4.5 (5)	--
1996	1.5 (4)	3.1 (4)	8.0 (12)	--	--	--	6.0 (3)	--
1997	0.5 (1)	6.0 (10)	8.5 (14)	--	--	5.8 (1)	6.6 (3)	--
1998	1.2 (1)	4.5 (11)	--	--	--	--	--	--
1999	1.1 (1)	--	--	--	--	--	--	--
Stray hatchery,								
1990	--	--	6.8 (4)	--	--	--	6.4 (2)	--
1991	--	--	5.1 (1)	--	--	--	5.9 (3)	--
1992	--	--	--	--	--	--	6.9 (1)	--
1993	--	--	8.0 (1)	8.7 (1)	--	2.9 (1)	5.0 (1)	--
1994	--	--	6.2 (1)	--	--	--	7.8 (1)	--
1995	--	4.4 (1)	--	--	--	--	--	--
1996	--	--	6.2 (1)	--	--	--	--	--
1997	--	3.4 (1)	5.1 (1)	--	--	--	6.2 (6)	--
1998	--	2.9 (3)	--	--	--	--	--	--

Table 93. Jack and adult fall chinook salmon sex ratios as a percentage of females; by origin, run year, and age category. Fish were sampled at the Powerdale Dam trap. (Sample size is in parentheses.)

Origin,	Freshwater.Total age							
run year	1.2[a]	1.3	1.4	1.5	1.6	2.3[a]	2.4	2.5
Natural,								
1992	0 (2)	100 (2)	50 (10)	0 (1)	100 (1)	--	--	--
1993	--	0 (1)	100 (3)	100 (2)	--	--	--	--
1994	0 (2)	75 (4)	67 (12)	100 (2)	--	0 (1)	100 (2)	100 (2)
1995	0 (1)	--	100 (1)	100 (1)	--	100 (1)	50 (2)	0 (2)
1996	--	0 (1)	33 (9)	--	--	0 (1)	100 (1)	--
1997	--	67 (6)	57 (7)	--	--	50 (2)	33 (6)	33 (3)
1998	75 (4)	90 (10)	50 (4)	75 (8)	--	--	50 (4)	100 (3)
1999	0 (1)	75 (4)	100 (3)	100 (1)	--	--	60 (5)	100 (2)
2000	100 (1)	80 (10)	58 (12)	100 (5)	--	100 (1)	100 (3)	--
2001	0 (1)	55 (11)	93 (14)	--	--	--	100 (3)	--
Stray hatchery,								
1992	100 (1)	100 (2)	100 (2)	--	--	--	--	--
1993	--	0 (1)	50 (2)	100 (1)	--	--	--	--
1994	--	--	100 (4)	--	--	--	100 (2)	--
1995	--	--	100 (1)	--	--	--	67 (3)	--
1996	--	--	--	--	--	100 (1)	100 (1)	--
1997	--	--	0 (1)	--	--	--	100 (1)	--
1998	--	100 (1)	0 (1)	100 (1)	--	--	0 (1)	--
2000	--	100 (1)	100 (1)	--	--	--	--	--
2001	--	33 (3)	0 (1)	--	--	--	67 (6)	--

[a] Jacks were classified as females based on visual observation.

Table 94. Bi-weekly counts of upstream migrant jack and adult coho salmon captured at the Powerdale Dam trap; by origin and run year. Counts are boldfaced for the bi-weekly period in which the median date of migration occurred in each origin category.

Origin,	August		September		October		November		December		
run year	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-30	01-15	16-31	Total
Natural,											
1992	0	0	1	**11**	5	4	1	0	0	0	22
1993	--	--	--	--	--	--	--	--	--	--	0
1994[a]	0	0	0	0	**1**	0	0	0	0	0	1
1995[b]	0	0	3	1	**4**	3	0	0	0	0	11
1996	0	0	0	1	**4**	1	0	0	0	0	6
1997	0	0	0	**3**	2	1	0	0	0	0	6
1998	0	0	0	1	**3**	0	0	1	0	0	5
1999	0	0	0	1	**4**	1	3	0	1	0	10
2000	0	0	2	2	0	**4**	1	0	0	0	9
2001	0	0	0	3	5	**5**	7	0	0	0	20
Stray hatchery,											
1992	0	1	6	**37**	12	12	11	0	0	0	79
1993	0	0	0	3	10	**10**	0	3	2	0	28
1994[a]	0	0	3	15	**11**	23	0	0	0	0	52
1995[b]	0	1	0	12	**15**	11	0	0	0	0	39
1996	0	0	0	3	**12**	5	0	0	0	0	20
1997	0	0	0	1	**2**	3	0	0	0	0	6
1998	0	0	0	10	10	**9**	8	7	0	0	44
1999	0	0	0	7	**6**	3	0	0	3	0	19
2000	0	0	5	**14**	4	8	2	0	0	0	33
2001	0	0	2	18	208	**475**	173	101	0	0	977
Unknown,											
1992	0	0	0	**1**	0	1	0	0	0	0	2
1993	0	1	**2**	1	0	0	0	0	1	0	5
1994[a]	0	0	1	0	0	**2**	0	0	0	0	3
1995[b]	0	0	0	0	**1**	0	0	0	0	0	1
1996	0	0	0	0	**1**	0	0	0	0	0	1
1997	0	0	**1**	0	0	0	0	0	0	0	1
1998	0	0	0	0	1	2	**3**	4	0	0	10
1999	0	0	0	0	**1**	0	0	1	0	0	2

Table 94. Continued.

Origin,	August		September		October		November		December		
run year	01-15	16-31	01-15	16-30	01-15	16-31	01-15	16-30	01-15	16-31	Total
Unknown, (cont.)											
2000	--	--	--	--	--	--	--	--	--	--	0
2001	0	0	0	1	7	**6**	6	3	0	0	23

a Trap was inoperable from 10/27-11/07/94 because of flood damage.

b Powerdale Dam trap was inoperative from 11-13 November 1995 and from 20-24 November 1995 because of flood damage and from 28 November 1995 through 27 February 1996 for modifications to the adult fish ladder.

Table 95. Estimated harvest of unmarked and stray hatchery jack and adult coho salmon in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2000. Estimates of harvest are combined for jack and adult fish. Confidence limits (95%) are in parenthesis.

	Unmarked coho salmon		Stray coho salmon		Catch Rate
Period	Kept	Released	Kept	Released	(hrs/fish)
Oct 1-15	--	--	--	--	--
Oct 16-31	--	--	--	--	--
Nov 1-15	--	--	--	--	--
Nov 16-30	--	--	--	--	--
Dec 1-15	--	--	--	--	--
Dec 16-31	--	--	--	--	--
Total	0	0	0	0	0

Table 96. Estimated harvest of unmarked and stray hatchery jack and adult coho salmon in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2001. Estimates of harvest are combined for jack and adult fish. Confidence limits (95%) are in parenthesis.

	Unmarked coho salmon		Stray coho salmon		Catch Rate
Period	Kept	Released	Kept	Released	(hrs/fish)
Oct 1-15	--	--	--	--	--
Oct 16-31	--	--	--	--	--
Nov 1-15	--	1 (1.5)	6 (8.9)	2 (2.7)	40
Nov 16-30	--	--	--	2 (3.9)	321
Dec 1-15	--	3 (5.0)	--	--	399
Dec 16-31	--	--	--	--	--
Total	0	4 (5.2)	6 (8.9)	4 (4.7)	326[a]

[a] Estimate of mean catch rate is for the period 1 October - 31 December.

Table 97. Jack and adult coho salmon escapements to the Powerdale Dam trap; by origin, run year, and age category. Fish of unknown origin were allocated to origin categories based on scale analysis and the ratio of fish of known origin (*see* **METHODS**).

Origin, run year	Total escapement	Freshwater.Total age 1.2	1.3	2.2	2.3	3.4
Natural,						
1992	23	--	--	0	23	0
1993	0	--	--	0	0	0
1994	1	--	--	0	1	0
1995	11	--	--	0	10	1
1996	6	--	--	0	6	0
1997	6	--	--	0	6	0
1998	12	--	--	0	12	0
1999	11	--	--	0	11	0
2000	9	--	--	1	8	0
2001	24	--	--	4	20	0
Stray hatchery,						
1992	80	0	0	13	67	--
1993	33	0	0	0	33	--
1994	55	0	0	3	52	--
1995	40	0	0	4	36	--
1996	21	0	0	1	20	--
1997	7	0	0	0	7	--
1998	47	0	0	1	46	--
1999	20	0	0	1	19	--
2000	33	1	8	4	20	--
2001	996	0	0	7	989	--

Table 98. Age composition (percent) of jack and adult coho salmon sampled at the Powerdale Dam trap; by origin, run year, and age category.

Origin, run year	N	Freshwater.Total age 1.2	1.3	2.2	2.3	3.4
Natural,						
1992	22	--	--	--	100	--
1993	0	--	--	--	--	--
1994	1	--	--	--	100	--
1995	11	--	--	--	90.9	9.1
1996	6	--	--	--	100	--
1997	6	--	--	--	100	--
1998	5	--	--	--	100	--
1999	10	--	--	--	100	--
2000	9	--	--	11.1	88.9	--
2001	19	--	--	21.1	78.9	--
Stray hatchery,						
1992	79	--	--	16.5	83.5	--
1993	28	--	--	--	100	--
1994	52	--	--	5.8	94.2	--
1995	39	--	--	10.3	89.7	--
1996	20	--	--	5.0	95.0	--
1997	6	--	--	--	100	--
1998	44	--	--	2.3	97.7	--
1999	19	--	--	5.3	94.7	--
2000	33	3.0	24.2	12.1	60.6	--
2001	976	--	--	0.7	99.3	--

Table 99. Mean fork length (cm) of jack and adult coho salmon; by origin, sample population (i.e., sex), and age category. Fish were sampled from the 2000 run year of coho salmon escaping to the adult trap located at Powerdale Dam.

Origin, sample pop., statistic	Freshwater.Total age 2.2	2.3	Sample mean
Natural,			
Females,			
N	1	6	7
Mean	40.5	69.67	65.50
STD	--	8.52	13.49
Range	40.5	54.5-77.0	40.5-77.0
Males,			
N	--	2	2
Mean	--	73.00	73.00
STD	--	4.24	4.24
Range	--	70.0-76.0	70.0-76.0
Totals,			
N	1	8	9
Mean	40.5	70.50	67.17
STD	--	7.54	12.23
Range	40.5	54.5-77.0	40.5-77.0

Table 100. Mean fork length (cm) of jack and adult coho salmon; by origin, sample population (i.e., sex), and age category. Fish were sampled from the 2001 run year of coho salmon escaping to the adult trap located at Powerdale Dam.

Origin, sample pop., statistic	Freshwater.Total age 2.2	2.3	Sample[a] mean
Natural,			
Females,			
N	3	9	12
Mean	37.67	72.00	63.42
STD	2.02	5.24	16.18
Range	36.5-40.0	63.5-79.0	36.5-79.0
Males,			
N	1	6	8
Mean	40.0	70.58	66.88
STD	--	8.42	12.99
Range	40.0	55.0-78.0	40.0-78.0
Totals,			
N	4	15	20
Mean	38.25	71.43	64.80
STD	2.02	6.44	14.72
Range	36.5-40.0	55.0-79.0	36.5-79.0

[a] Mean estimates include coho salmon in which the origin, but not the age of the fish, could be determined from the scale sample.

Table 101. Mean fork length (cm) of jack and adult coho salmon; by origin, brood year, and age category. Fish were sampled at the Powerdale Dam trap. [Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables and in Olsen et al. (1994), Olsen et al. (1995), Olsen et al. (1996), Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).]

Origin,	Freshwater.Total age				
brood year	1.2	1.3	2.2	2.3	3.4
Natural,					
1989	--	--	--	58 (22)	--
1990	--	--	--	--	--
1991	--	--	--	56 (1)	60 (1)
1992	--	--	--	65 (10)	--
1993	--	--	--	70 (6)	--
1994	--	--	--	61 (6)	--
1995	--	--	--	63 (5)	--
1996	--	--	--	70 (10)	--
1997	--	--	--	70 (8)	--
1998	--	--	40 (1)	71 (15)	--
1999	--	--	38 (4)	--	--
Stray hatchery,					
1989	--	--	--	58 (66)	--
1990	--	--	38 (13)	65 (28)	--
1991	--	--	--	69 (49)	--
1992	--	--	39 (3)	68 (35)	--
1993	--	--	40 (4)	71 (19)	--
1994	--	--	36 (1)	64 (6)	--
1995	--	--	--	67 (43)	--
1996	--	--	36 (1)	72 (18)	--
1997	--	68 (8)	38 (1)	65 (20)	--
1998	33 (1)	--	39 (4)	69 (969)	--
1999	--	--	40 (7)	--	--

Table 102. Mean weight (kg) of jack and adult coho salmon; by origin, sample population (i.e., sex), and age category. Fish were sampled from the 2000 run year of coho salmon escaping to the adult trap located at Powerdale Dam.

Origin, sample pop.,	Freshwater.Total age		Sample
statistic	2.2	2.3	mean
Natural,			
Females,			
N	1	6	7
Mean	0.8	4.25	3.76
STD	--	1.40	1.82
Range	0.8	1.8-5.5	0.8-5.5
Males,			
N	--	2	2
Mean	--	4.35	4.35
STD	--	0.92	0.92
Range	--	3.7-5.0	3.7-5.0
Totals,			
N	1	8	9
Mean	0.8	4.28	3.89
STD	--	1.23	1.63
Range	0.8	1.8-5.5	0.8-5.5

Table 103. Mean weight (kg) of jack and adult coho salmon; by origin, sample population (i.e., sex), and age category. Fish were sampled from the 2001 run year of coho salmon escaping to the adult trap located at Powerdale Dam.

Origin, sample pop., statistic	Freshwater.Total age 2.2	2.3	Sample[a] mean
Natural,			
Females,			
N	3	9	12
Mean	0.63	4.20	3.31
STD	0.06	0.84	1.77
Range	0.6-0.7	2.9-5.2	0.6-5.2
Males,			
N	1	6	8
Mean	0.8	4.05	3.64
STD	--	1.24	1.55
Range	0.8	1.8-5.1	0.8-5.1
Totals,			
N	4	15	20
Mean	0.68	4.14	3.44
STD	0.10	0.98	1.65
Range	0.6-0.8	1.8-5.2	0.6-5.2

[a] Mean estimates include coho salmon in which the origin, but not the age of the fish, could be determined from the scale sample.

Table 104. Mean weight (kg) of jack and adult coho salmon; by origin, brood year, and age category. Fish were sampled at the Powerdale Dam trap. [Sample size is in parentheses. Sample statistics, by run year, are presented in previous tables and in Olsen et al. (1995), Olsen et al. (1996), Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).]

Origin,	Freshwater.Total age				
brood year	1.2	1.3	2.2	2.3	3.4
Natural,					
1991	--	--	--	1.8 (1)	2.7 (1)
1992	--	--	--	3.3 (10)	--
1993	--	--	--	3.9 (6)	--
1994	--	--	--	2.5 (6)	--
1995	--	--	--	4.8 (5)	--
1996	--	--	--	4.1 (10)	--
1997	--	--	--	4.3 (8)	--
1998	--	--	0.8 (1)	4.1 (15)	--
1999	--	--	0.7 (4)	--	--
Stray hatchery,					
1991	--	--	--	3.7 (49)	--
1992	--	--	0.7 (3)	3.5 (35)	--
1993	--	--	0.8 (4)	4.1 (19)	--
1994	--	--	0.5 (1)	3.0 (6)	--
1995	--	--	--	3.6 (43)	--
1996	--	--	0.6 (1)	4.6 (18)	--
1997	--	3.5 (8)	0.7 (1)	3.4 (20)	--
1998	0.5 (1)	--	0.8 (4)	3.4 (969)	--
1999	--	--	1.1 (7)	--	--

Table 105. Jack and adult coho salmon sex ratios as a percentage of females; by origin, run year, and age category. Fish were sampled at the Powerdale Dam trap. (Sample size is in parentheses.)

Origin,	Freshwater.Total age				
run year	1.2	1.3	2.2[a]	2.3	3.4
Natural,					
1992	--	--	--	64 (22)	--
1993	--	--	--	--	--
1994	--	--	--	0 (1)	--
1995	--	--	--	50 (10)	100 (1)
1996	--	--	--	33 (6)	--
1997	--	--	--	0 (6)	--
1998	--	--	--	60 (5)	--
1999	--	--	--	60 (10)	--
2000	--	--	100 (1)	75 (8)	--
2001	--	--	75 (4)	60 (15)	--
Stray hatchery,					
1992	--	--	62 (13)	36 (66)	--
1993	--	--	--	21 (28)	--
1994	--	--	33 (3)	43 (49)	--
1995	--	--	0 (4)	21 (34)	--
1996	--	--	0 (1)	58 (19)	--
1997	--	--	--	33 (6)	--
1998	--	--	100 (1)	14 (43)	--
1999	--	--	0 (1)	28 (18)	--
2000	0 (1)	38 (8)	25 (4)	45 (20)	--
2001	--	--	29 (7)	31 (969)	--

[a] Jacks were classified as females based on visual observation.

Table 106. Summary, by run year, of 1) number of adult summer steelhead used for hatchery broodstock[a], 2) number of family groups represented in the hatchery brood, 3) number of spawnings during the spawning period, 4) egg take, 5) number of smolts produced, and 6) egg to smolt survival for the hatchery summer steelhead program in the Hood River subbasin.

Run year	Numbers spawned[b]			Family groups	Number of spawnings	Total[c] egg take	Number of smolts	Egg to[d] smolt survival
	Females	Males	Total					
1997-1998	7	2	9	10	5	30,218	19,513	64.6%
1998-1999	14	11(3)	25	29	8	39,417[e]	33,899	86.0%
1999-2000	13	9	22	26	9	52,384	37,665	71.9%
2000-2001	13	10	23	27	8	63,161	--	--

[a] Hatchery broodstock was collected entirely from the wild (i.e., unmarked) component of the run.

[b] Number of unmarked hatchery adults inadvertently used for broodstock are in parenthesis and included in the totals, by sex.

[c] Green egg take.

[d] Unless otherwise specified in the total egg take column, estimates of egg to smolt survival are not adjusted for any eggs that were destroyed because 1) they tested positive for IHN or 2) gametes were the product of parents that failed to meet the brood year specific hatchery protocols for incorporation of hatchery adults into the broodstock (*see* **HATCHERY PRODUCTION; Broodstock Collection**).

[e] Egg take was adjusted for the loss of eggs fertilized by three unmarked males classified as hatchery fish based on scale analysis. The three unmarked hatchery males were used for spawning prior to the scale read. Approximately 13,258 eggs were discarded from the estimated total green egg take.

Table 107. Summary, by run year, of 1) number of adult winter steelhead used for hatchery broodstock[a], 2) number of family groups represented in the hatchery brood, 3) number of spawnings during the spawning period, 4) egg take, 5) number of smolts produced, and 6) egg to smolt survival for the hatchery winter steelhead program in the Hood River subbasin.

Run year	Numbers spawned[b]			Family groups	Number of spawnings	Total[c] egg take	Number of smolts	Egg to[d] smolt survival
	Females	Males	Total					
1990-1991[e]	3(2)	1	4	3	2	11,858	4,595	38.8%
1991-1992[f]	18	22(1)	40	57	6	50,748	48,985	96.5%
1992-1993	16	21	37	78	6	62,150	38,034	61.2%
1993-1994	26	28	54	70	8	95,043	42,860	45.1%
1994-1995	18	19	37	47	8	63,790	50,896	79.8%
1995-1996	24(4)	29(12)	53	60	10	85,497	59,837	70.0%
1996-1997	27(10)	27(12)	54	51	8	102,465	62,135	60.6%
1997-1998	21(10)	21(10)	42	37	9	80,620	46,781	58.0%
1998-1999	29(14)	33(13)	62	55	9	112,302	63,182	56.3%
1999-2000	20(10)	19(5)	39	21	8	83,401	50,879	61.0%
2000-2001	27(4)	35	62	50	10	112,302	--	--

[a] Hatchery broodstock was collected entirely from the wild (i.e., unmarked) component of the run in the 1991-1992 through 1994-1995 run years. Hood River stock hatchery winter steelhead were incorporated into the hatchery broodstock beginning with the 1995-1996 run year (*see* Olsen and French 1999).

[b] Number of hatchery adults used for broodstock are in parenthesis and included in the totals, by sex.

[c] Green egg take.

[d] Unless otherwise specified in the total egg take column, estimates of egg to smolt survival are not adjusted for any eggs that were destroyed because 1) they tested positive for IHN or 2) gametes were the product of parents that failed to meet the brood year specific hatchery protocols for incorporation of hatchery adults into the broodstock (*see* **HATCHERY PRODUCTION; Broodstock Collection**).

[e] Hatchery broodstock was collected from both wild and Big creek stocks of adult winter steelhead (*see* Olsen and French 1999).

[f] One unmarked adult, which was classified as a hatchery fish based on scale analysis, was incorporated into the hatchery broodstock.

Table 108. Hatchery summer steelhead smolt releases in the Hood River subbasin, by brood year[a].

Broodstock, hatchery, brood year	Fin clip[b] or coded wire tag	Survival rate (%)	Date(s) released	Fish/lb	Number released	Release location
Foster,[c] Oak Springs,						
1987	Ad	--	04/08/88	4.4	5,830	Hood River
1987	Ad	--	04/11/88	4.6	6,026	Hood River
1987	Ad	--	04/04-05/88	4.7	17,249	Hood River
1987	Ad	--	04/08/88	4.4	5,500	West Fork Hood River
1987	Ad	--	04/04/88	4.5	5,400	West Fork Hood River
1987	Ad	--	04/06/88	4.6	10,324	West Fork Hood River
1987	Ad	--	04/04-05/88	4.7	17,188	West Fork Hood River
1987	Ad	--	04/07/88	5.0	12,350	West Fork Hood River
1988	Ad	--	04/07/89	5.3	12,826	Hood River
1988	Ad	--	04/11/89	5.5	13,630	Hood River
1988	Ad	--	05/02-03/89	4.3	10,213	West Fork Hood River
1988	Ad	--	04/10/89	5.3	19,504	West Fork Hood River
1988	Ad	--	04/06-12/89	5.5	32,853	West Fork Hood River
1989	Ad	--	04/04/90	5.3	4,876	Hood River
1989	Ad	--	04/11/90	6.5	10,660	Hood River
1989	Ad	--	04/04-05/90	5.3	25,422	West Fork Hood River
1989	Ad	--	04/03/90	5.4	5,940	West Fork Hood River
1989	Ad	--	04/03-09/90	5.5	20,306	West Fork Hood River
1989	Ad	--	04/06/90	5.7	14,591	West Fork Hood River
1990	Ad	--	04/29/91	5.4	7,020	Hood River
1990	Ad	--	04/30/91	5.5	14,743	Hood River
1990	Ad	--	04/24/91	5.8	7,013	Hood River
1990	Ad	--	04/22/91	5.2	12,787	West Fork Hood River
1990	Ad	--	04/23/91	5.3	6,943	West Fork Hood River
1990	Ad	--	04/24/91	5.5	6,869	West Fork Hood River
1990	Ad	--	04/23/91	5.6	6,776	West Fork Hood River
1990	Ad	--	04/23/91	5.8	14,981	West Fork Hood River
1991	Ad	--	04/08/92	4.8	5,880	Hood River
1991	Ad	--	04/07/92	5.2	12,870	Hood River
1991	Ad	--	04/06/92	5.4	13,365	Hood River
1991	Ad	--	04/08/92	5.5	6,958	Hood River
1991	Ad	--	04/07/92	4.7	15,082	West Fork Hood River
1991	Ad	--	04/07/92	5.2	15,023	West Fork Hood River
1991	Ad	--	04/06/92	5.4	13,750	West Fork Hood River
1991	Ad	--	04/08/92	5.5	17,045	West Fork Hood River
1992	Ad	--	04/07-08/93	6.0	33,570	West Fork Hood River
1992	Ad	--	05/04/93	6.3	17,955	West Fork Hood River
1992	Ad	--	05/05/93	6.5	19,403	West Fork Hood River

Table 108. Continued.

Broodstock, hatchery, brood year	Fin clip[b] or coded wire tag	Survival rate (%)	Date(s) released	Fish/lb	Number released	Release location
Foster,[c] (cont.)						
Oak Springs,						
1993	Ad	--	03/29-31/94	4.6	71,760	West Fork Hood River
1993	Ad	--	03/29/94	4.8	5,880	West Fork Hood River
1993	Ad	--	03/30-31/94	5.2	12,402	West Fork Hood River
1994	Ad	--	04/11/95	4.6	13,600	West Fork Hood River
1994	Ad	--	04/10-11/95	5.3	46,232	West Fork Hood River
1994	Ad	--	04/12/95	5.5	16,498	West Fork Hood River
1995	Ad	--	04/01-11/96	5.2	48,346	West Fork Hood River
1995	Ad	--	04/03/96	5.5	15,017	West Fork Hood River
1995	Ad	--	04/11-12/96	5.9	5,015	West Fork Hood River
1996	Ad	--	04/09/97	5.0	12,745	West Fork Hood River
1996	Ad	--	04/10/97	5.0	5,250	West Fork Hood River
1996	Ad	--	04/10/97	5.1	14,890	West Fork Hood River
1996	Ad	--	04/10/97	5.5	14,850	West Fork Hood River
1996	Ad	--	04/15/97	5.2	9,360	West Fork Hood River
1996	Ad	--	04/16/97	5.0	2,044	West Fork Hood River
1996	Ad	--	04/16/97	5.3	1,854	West Fork Hood River
1997	Ad	--	04/08/98	4.9	12,250	Below Powerdale Dam (@ RM 4.5)
1997	Ad	--	04/08/98	5.4	29,024	Below Powerdale Dam (@ RM 4.5)
1997	Ad	--	04/08/98	5.7	15,518	Below Powerdale Dam (@ RM 4.5)
1997	Ad	--	04/09/98	5.8	8,118	Below Powerdale Dam (@ RM 4.5)
1998	Ad	--	04/07-08/99	6.0	32,697	Below Powerdale Dam (@ RM 4.5)
1998	Ad	--	04/08/99	6.8	17,000	Below Powerdale Dam (@ RM 4.5)
1998	Ad	--	04/08-09/99	5.6	12,521	Below Powerdale Dam (@ RM 4.5)
1999	Ad	--	04/12/2000	5.7	14,049	Below Powerdale Dam (@ RM 4.5)
1999	Ad	--	04/13/2000	6.4	16,320	Below Powerdale Dam (@ RM 4.5)
1999	Ad	--	04/13/2000	5.8	14,960	Below Powerdale Dam (@ RM 4.5)
1999	Ad	--	04/14/2000	6.4	3,949	Below Powerdale Dam (@ RM 4.5)
2000	Ad	--	04/10/2001	6.0	24,900	Below Powerdale Dam (@ RM 4.5)
2000	Ad	--	04/11/2001	6.4	30,400	Below Powerdale Dam (@ RM 4.5)
2000	Ad	--	04/12/2001	6.5	5,038	Below Powerdale Dam (@ RM 4.5)
2000	Ad	--	04/16/2001	212.2	2,016	mainstem Hood R (@ RM 12 in FID)
Hood River,						
Oak Springs,						
1998	LM	--	04/15/99	5.5	15,616	West Fork Hood River
1998	LM	--	05/10/99	6.6	3,897	Near mouth of Hood River

Table 108. Continued.

Broodstock, hatchery, brood year	Fin clip[b] or coded wire tag	Survival rate (%)	Date(s) released	Fish/lb	Number released	Release location
Hood River, Oak Springs, (cont.)						
1999	LM	--	04/13/2000	6.2	4,686	West Fork Hood River
1999	RM	--	04/13/2000	6.2	10,934	West Fork Hood River
1999	LM	--	04/27/2000	5.2	4,063	West Fork Hood River
1999	RM	--	04/27/2000	5.2	9,478	West Fork Hood River
1999	LM	--	05/09/2000	6.2	1,421	Near mouth of Hood River
1999	RM	--	05/09/2000	6.2	3,317	Near mouth of Hood River
2000	LM	--	04/12/2001	7.2	9,260	West Fork Hood River
2000	Ad-LM	--	04/12/2001	7.2	2,257	West Fork Hood River
2000	LM	--	04/18/2001	6.8	9,306	West Fork Hood River
2000	Ad-LM	--	04/18/2001	6.8	2,269	West Fork Hood River
2000	LM	--	04/30/2001	6.4	4,619	West Fork Hood River
2000	Ad-LM	--	04/30/2001	6.4	1,126	West Fork Hood River
2000	LM	--	05/15/2001	8.1	7,098	Near mouth of Hood River
2000	Ad-LM	--	05/15/2001	8.1	1,730	Near mouth of Hood River

[a] Production releases prior to the 1987 brood are in ODFW and CTWSRO (1990).
[b] Ad = Adipose; LM = Left Maxillary; RM = Right Maxillary.
[c] The Foster stock was developed from the Skamania stock of summer steelhead.

Table 109. Hatchery winter steelhead smolt releases in the Hood River subbasin, by brood year[a].

Broodstock, hatchery, brood year	Fin clip[b] or coded wire tag	Survival rate (%)	Date(s) released	Fish/lb	Number released	Release location
Big Creek,						
Trojan Ponds,						
1988	No mark	--	04/17/89	4.2	4,890	East Fork Hood River
1989	Ad	--	04/12/90	4.7	4,253	Middle Fork Hood River
1989	Ad	--	04/12/90	4.7	7,755	East Fork Hood River
Gnat Creek,						
1987	No mark	--	04/22/88	5.6	28,000	Middle Fork Hood River
1989	Ad	--	05/09/90	5.4	12,015	Middle Fork Hood River
1989	Ad	--	05/09/90	5.4	12,015	East Fork Hood River
1990	Ad-LM	--	04/23/91	5.2	5,356	Middle Fork Hood River
1990	Ad-LM	--	04/23/91	5.2	15,078	East Fork Hood River
Mixed,[c]						
Oak Springs,						
1991	Ad	--	03/31/92	4.6	4,595	East Fork Hood River
Hood River,						
Oak Springs,						
1992	Ad-LP	--	04/06/93	5.8	15,225	Middle Fork Hood River
1992	Ad-LP	--	04/06/93	6.0	15,420	East Fork Hood River
1992	Ad-LP	--	04/06/93	5.6	18,340	East Fork Hood River
1993	Ad-LM	--	04/12-13/94	4.5	7,423	East Fork Hood River
1993	Ad-LV;07-05-36	--	04/12-13/94	4.5	6,863	East Fork Hood River
1993	Ad-LV;07-05-37	--	04/12-13/94	4.5	6,189	East Fork Hood River
1993	Ad-LM	--	04/12/94	5.4	2,414	East Fork Hood River
1993	Ad-LV;07-05-38	--	04/12/94	5.4	6,445	East Fork Hood River
1993	Ad-LV;07-05-39	--	04/12/94	5.4	6,531	East Fork Hood River
1993	Ad-LP	--	06/28/94	5.8	2,169	East Fork Hood River
1994	Ad-LV;07-08-63	--	04/19-20/95	5.1	10,534	East Fork Hood River
1994	Ad-LV;07-09-16	--	04/19-20/95	5.1	10,367	East Fork Hood River
1994	Ad-LV;07-09-17	--	04/19/95	5.4	3,426	East Fork Hood River
1994	Ad-LV;07-09-17	--	04/19/95	5.8	7,707	East Fork Hood River
1994	Ad-LV;07-09-18	--	04/19/95	5.4	3,331	East Fork Hood River
1994	Ad-LV;07-09-18	--	04/19/95	5.8	7,495	East Fork Hood River
1995	Ad-LV-RM;07-11-31	--	04/02/96	5.5	5,621	East Fork Hood River
1995	Ad-LV-RM;07-11-31	--	04/01/96	5.7	11,649	East Fork Hood River
1995	Ad-LV-RM;07-11-31	--	04/04/96	5.8	3,508	East Fork Hood River
1995	Ad-LV-RM;07-11-32	--	04/22-24/96	5.0	19,913	East Fork Hood River
1995	Ad-RM	--	04/22-24/96	5.0	3,793	East Fork Hood River
1995	Ad-RM	--	04/02/96	5.5	115	East Fork Hood River

Table 109. Continued.

Broodstock, hatchery, brood year	Fin clip[b] or coded wire tag	Survival rate (%)	Date(s) released	Fish/lb	Number released	Release location
Hood River, Oak Springs, (cont.)						
1995	Ad-RM	--	04/01/96	5.7	238	East Fork Hood River
1995	Ad-RM	--	04/04/96	5.8	72	East Fork Hood River
1995	Ad-LV-RM;07-11-31	--	04/04/96	5.5	749	Hood River (RM 0.5)
1995	Ad-LV-RM;07-11-31	--	04/04/96	5.7	1,553	Hood River (RM 0.5)
1995	Ad-LV-RM;07-11-31	--	04/04/96	5.8	468	Hood River (RM 0.5)
1995	Ad-LV-RM;07-11-32	--	04/22/96	5.0	2,655	Hood River (RM 0.5)
1995	Ad-RM	--	04/04/96	5.0	505	Hood River (RM 0.5)
1995	Ad-RM	--	04/04/96	5.5	15	Hood River (RM 0.5)
1995	Ad-RM	--	04/04/96	5.7	32	Hood River (RM 0.5)
1995	Ad-RM	--	04/04/96	5.8	10	Hood River (RM 0.5)
1996	Ad-LM	--	04/11/97	5.8	16,791	East Fork Hood River
1996	Ad-LM	--	04/15/97	5.6	10,920	East Fork Hood River
1996	Ad-LM	--	05/05/97	8.3	32,126	East Fork Hood River
1997	Ad-RM	--	04/14/98	5.2	29,510	East Fork Hood River
1997	Ad-RM	--	04/28/98	7.5	31,707	East Fork Hood River
1997	Ad-RM	--	06/04/98	9.0	918	East Fork Hood River
1998	Ad-RV	--	04/15/99	5.6	12,430	East Fork Hood River
1998	Ad-RV	--	05/05/99	5.8	10,572	East Fork Hood River
1998	Ad-RV	--	04/14/99	5.6	9,857	Middle Fork Hood River
1998	Ad-RV	--	05/05/99	6.0	9,816	Middle Fork Hood River
1998	Ad-RV	--	04/08/99	5.6	1,792	Below Powerdale Dam (@ RM 4.5)
1998	Ad-RV	--	05/25/99	8.1	2,314	Near mouth of Hood River
1999	Ad-LV;09-29-23	--	04/17/2000	7.3	13,852	East Fork Hood River
1999	Ad-LV;09-29-24	--	05/01/2000	7.8	15,694	East Fork Hood River
1999	Ad-LV;09-29-23	--	04/17/2000	7.3	15,279	Middle Fork Hood River
1999	Ad-LV;09-29-24	--	05/01/2000	7.7	15,578	Middle Fork Hood River
1999	Ad-LV;09-29-23	--	05/16/2000	10.2	739	Near Mouth of Hood River
1999	Ad-LV;09-29-23	--	05/19/2000	11.2	602	Near Mouth of Hood River
1999	Ad-LV;09-29-24	--	05/16/2000	10.2	851	Near Mouth of Hood River
1999	Ad-LV;09-29-24	--	05/19/2000	11.2	587	Near Mouth of Hood River
2000	Ad-RV	--	04/30/2001	5.3	13,265	East Fork Hood River
2000	Ad-RV	--	05/14/2001	4.4	3,782	East Fork Hood River
2000	Ad-RV	--	05/14/2001	6.4	8,557	East Fork Hood River
2000	Ad-RV	--	04/30/2001	5.6	14,535	Middle Fork Hood River
2000	Ad-RV	--	05/14/2001	5.9	10,484	Middle Fork Hood River

Table 109. Continued.

Broodstock, hatchery, brood year	Fin clip[b] or coded wire tag	Survival rate (%)	Date(s) released	Fish/lb	Number released	Release location
Hood River, Oak Springs, (cont.)						
2000	Ad-RV	--	06/06/2001	9.0	256	Near mouth of Hood River

[a] Production releases prior to the 1987 brood are in ODFW and CTWSRO (1990).
[b] Ad = Adipose; LV = Left Ventral; RV = Right Ventral; LP = Left Pectoral; LM = Left Maxillary; RM = Right Maxillary.
[c] The 1991 brood are progeny of wild x Big Creek stock hatchery crosses.

Table 110. Hatchery juvenile spring chinook salmon releases in the Hood River subbasin by brood year[a].

Life history stage, broodstock, hatchery, brood year	Fin clip[b] or coded wire tag	Survival rate (%)	Date(s) released	Fish/lb	Number released[c]	Release location
Fingerling,						
Carson,						
Irrigon,						
1985	No mark	--	06/18/86	23.0	92,680	West Fork Hood River
Smolt,						
Carson,						
Bonneville,						
1986	No mark	--	03/14/88	9.4	11,724	West Fork Hood River
1986	No mark	--	03/14/88	9.7	30,895	West Fork Hood River
1986	No mark	--	03/14/88	10.1	11,644	West Fork Hood River
1986	No mark	--	03/14/88	10.2	12,288	West Fork Hood River
1986	No mark	--	03/14/88	10.5	4,988	West Fork Hood River
1986	No mark	--	03/14/88	10.8	9,150	West Fork Hood River
1986	No mark	--	03/14/88	11.1	14,570	West Fork Hood River
1986	Ad;07-42-57	--	03/14/88	11.2	34,548	West Fork Hood River
1986	Ad;07-42-57	--	03/14/88	11.4	14,443	West Fork Hood River
1986	Ad;07-42-57	--	03/14/88	11.6	5,689	West Fork Hood River
1987	No mark	--	03/09/89	10.0	33,013	West Fork Hood River
1987	No mark	--	03/09/89	10.8	31,828	West Fork Hood River
1987	No mark	--	03/09/89	11.0	7,419	West Fork Hood River
1987	Ad;07-42-58	--	03/09/89	11.0	24,698	West Fork Hood River
1987	No mark	--	03/09/89	11.1	8,568	West Fork Hood River
1987	Ad;07-42-58	--	03/09/89	11.1	28,521	West Fork Hood River
1988	Ad;07-52-23	--	03/13/90	9.4	23,970	West Fork Hood River
1988	No mark	--	03/12-13/90	9.9	42,565	West Fork Hood River
1988	No mark	--	03/13/90	10.0	20,799	West Fork Hood River
1988	Ad;07-52-23	--	03/13/90	10.0	10,650	West Fork Hood River
1988	No mark	--	03/12/90	10.1	11,209	West Fork Hood River
1988	No mark	--	03/12/90	10.2	13,973	West Fork Hood River
1988	Ad;07-52-23	--	03/14/90	10.2	10,761	West Fork Hood River
1988	No mark	--	03/12-13/90	10.3	30,483	West Fork Hood River
1988	Ad;07-52-23	--	03/14/90	10.4	14,144	West Fork Hood River
1988	No mark	--	03/12/90	10.5	7,770	West Fork Hood River
1988	No mark	--	03/12/90	10.8	11,664	West Fork Hood River
1989	Ad;07-55-30	--	03/25/91	9.4	53,614	West Fork Hood River
1989	No mark	--	03/25/91	9.8	29,399	West Fork Hood River
1989	No mark	--	03/25/91	11.2	42,419	West Fork Hood River
1990	No mark	--	04/02/92	9.7	41,647	West Fork Hood River
1990	No mark	--	04/02/92	9.9	62,954	West Fork Hood River
1990	Ad;07-56-59	--	04/02/92	10.2	58,694	West Fork Hood River

Table 110. Continued.

Life history stage, broodstock, hatchery, brood year	Fin clip or coded wire tag	Survival rate (%)	Date(s) released	Fish/lb	Number released[c]	Release location
Smolt, (cont.)						
Deschutes,						
Bonneville,						
1991	Ad;07-33-35	--	04/01/93	11.2	11,760	West Fork Hood River
1991	Ad;07-33-35	--	04/01/93	11.3	34,685	West Fork Hood River
1992[d]	--	--	--	--	--	--
Round Butte,						
1991	Ad;07-50-22 R2	--	04/08-09/93	6.7	28,760	West Fork Hood River
1992[d]	--	--	--	--	--	--
1993	Ad;07-05-49	--	04/04-05/95	13.1	13,111	West Fork Hood River
1993	Ad;07-05-49	--	04/03-04/95	13.2	13,211	West Fork Hood River
1993	Ad;07-05-49	--	04/03/95	13.7	12,865	West Fork Hood River
1993	Ad;07-05-49	--	04/04/95	13.8	13,175	West Fork Hood River
1993	No mark	--	04/04-05/95	13.1	29,455	West Fork Hood River
1993	No mark	--	04/03-04/95	13.2	29,682	West Fork Hood River
1993	No mark	--	04/03/95	13.7	28,905	West Fork Hood River
1993	No mark	--	04/04/95	13.8	29,600	West Fork Hood River
1994	Ad-RV;07-11-30	--	04/22-23/96	9.5	40,348	West Fork Hood River
1994	Ad-RV;07-11-30	--	04/10/96	10.0	25,776	West Fork Hood River
1994	Ad-RV;07-11-30	--	04/08/96	10.1	23,354	West Fork Hood River
1994	Ad-RV;07-11-30	--	04/09/96	10.3	23,893	West Fork Hood River
1994[e]	Ad;07-09-38	--	04/22-23/96	9.5	3,509	West Fork Hood River
1994[e]	Ad;07-09-38	--	04/10/96	10.0	2,241	West Fork Hood River
1994[e]	Ad;07-09-38	--	04/08/96	10.1	2,031	West Fork Hood River
1994[e]	Ad;07-09-38	--	04/09/96	10.3	2,078	West Fork Hood River
1995	Ad-LV;09-17-47	--	04/07/97	7.9	33,469	West Fork Hood River
1995	Ad-LV;09-17-47	--	04/08/97	8.2	11,928	West Fork Hood River
1995	Ad-LV;09-18-06	--	04/16/97	8.3	22,315	West Fork Hood River
1995	Ad-LV;09-18-06	--	04/17/97	8.2	10,138	West Fork Hood River
1995	Ad-LV;09-18-06	--	04/17/97	8.6	22,869	West Fork Hood River
1996	Ad-RV;09-22-26	--	04/09/98	9.8	62,049	West Fork Hood River
1996	Ad-RV;09-22-27	--	04/22/98	9.7	53,658	West Fork Hood River
1996	Ad-RV;09-22-27	--	04/22/98	9.7	8,053	West Fork Hood River

Table 110. Continued.

Life history stage, broodstock, hatchery, brood year	Fin clip or coded wire tag	Survival rate (%)	Date(s) released	Fish/lb	Number released[c]	Release location
Smolt, (cont.)						
Deschutes,						
Round Butte,						
1997	Ad-LV;09-25-55	--	04/08/99	7.5	35,163	West Fork Hood River
1997	Ad-LV;09-25-56	--	04/20/99	6.7	36,485	West Fork Hood River
1997	Ad-RM;09-25-57	--	04/12/99	6.4	30,164	Middle Fork Hood River
1997	Ad-RM;09-25-57	--	05/05/99	5.9	214	Near mouth of Hood River
1997	Ad-LV;09-25-55/56	--	05/06-11/99	8.3	19,322	Near mouth of Hood River
1998	Ad-LM;09-28-55	--	04/10/2000	8.3	17,186	West Fork Hood River
1998	Ad-LM;09-28-55	--	04/10/2000	7.6	30,277	West Fork Hood River
1998	Ad-LM;09-28-56	--	04/24/2000	6.3	16,107	West Fork Hood River
1998	Ad-LM;09-28-56	--	04/24/2000	6.4	28,222	West Fork Hood River
1998	Ad-LV;07-11-24	--	03/20/2000	14.9	1,535	Middle Fork Hood River
1998	Ad-LV;07-11-23	--	03/20/2000	14.9	1,403	Middle Fork Hood River
1998	Ad-LV;09-17-04	--	03/20/2000	14.9	1,188	Middle Fork Hood River
1998	Ad-RV;09-28-57	--	04/10/2000	6.7	15,175	Middle Fork Hood River
1998	Ad-RV;09-28-57	--	04/25/2000	5.7	15,085	Middle Fork Hood River
1998	Ad-LM;09-28-55	--	05/08/2000	7.0	2,445	Near mouth of Hood River
1998	Ad-LM;09-28-56	--	05/08/2000	7.0	2,377	Near mouth of Hood River
1998	Ad-LM;09-28-55	--	05/09/2000	7.5	757	Near mouth of Hood River
1998	Ad-LM;09-28-56	--	05/09/2000	7.5	713	Near mouth of Hood River
1998	Ad-LM;09-28-55	--	05/10/2000	7.5	2,248	Near mouth of Hood River
1998	Ad-LM;09-28-56	--	05/10/2000	7.5	2,117	Near mouth of Hood River
1998	Ad-RV;09-11-23	--	05/15/2000	5.7	11	Near mouth of Hood River
1998	Ad-RV;09-11-24	--	05/15/2000	5.7	13	Near mouth of Hood River
1998	Ad-RV;09-28-57	--	05/15/2000	5.7	57	Near mouth of Hood River
1998	Ad-RV;09-17-04	--	05/15/2000	5.7	10	Near mouth of Hood River
1999	Ad-LV;09-31-21	--	04/04/2001	9.6	20,451	WFk Hood R (Black. Cr)
1999	Ad-LV;09-31-21	--	04/04/2001	9.8	20,002	WFk Hood R (Jones Cr)
1999	Ad-LV;09-31-20	--	04/23/2001	10.5	24,554	WFk Hood R (Black. Cr)
1999	Ad-LV;09-31-20	--	04/23/2001	9.0	17,871	WFk Hood R (Jones Cr)
1999	Ad-RM;09-31-22	--	04/04/2001	9.6	31,319	MFk Hood R (Parkdale)
1999	Ad-RV;09-32-09	--	04/04/2001	14.2	7,066	MFk Hood R (Parkdale)
1999	Ad-LV;09-31-20	--	05/14/2001	8.6	1,843	Near mouth of Hood River
1999	Ad-LV;09-31-21	--	05/14/2001	8.6	1,534	Near mouth of Hood River
1999	Ad-RM;09-31-22	--	05/14/2001	5.7	23	Near mouth of Hood River
1999	Ad-RV;09-32-09	--	05/14/2001	5.7	16	Near mouth of Hood River

Table 110. Continued.

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[a] The 1986 brood release is the first production release of hatchery spring chinook smolts into the Hood River subbasin.

[b] Ad = Adipose; LV = Left Ventral; RV = Right Ventral; LM = Left Maxillary; RM = Right Maxillary.

[c] Estimates for the 1994-1998 brood releases were adjusted for mortality at downstream migrant screw traps.

[d] No hatchery spring chinook salmon were released from the 1992 brood.

[e] This coded wire tag group was to have been released in its entirety in the Deschutes River but seals broke around the rotary screens, used to prevent movement among cells in Pelton ladder, allowing a small percentage of this tag group to mix with fish destined for release in the Hood River.

Table 111. Estimated numbers of hatchery summer and winter steelhead smolts migrating past a juvenile migrant trap located at RM 4.5 in the mainstem Hood River. (Population estimators and sampling period are in **APPENDIX A**.)

Race, stock, brood year	Hatchery[a] production release	Estimated number of smolts passing the mainstem migrant trap			
		Estimate	95% C.I.	% of production release	
				Estimate	Range
Summer,					
Foster,[b]					
1993	90,042	37,324	25,795 - 48,853	41.5	29 - 54
1994	76,330	23,671[c]	*d* - 74,473	31.0	*d* - 100
1995	68,378	28,250[c]	19,763 - 36,737	41.3	29 - 54
1996	60,993	29,825[c]	20,427 - 39,223	48.9	33 - 64
Hood River,					
1998	15,616	13,118	8,995 - 17,241	84.0	58 - 100
1999	29,161	25,126	18,563 - 31,689	86.2	64 - 100
2000	28,837	9,272[e]	1,528 - 17,016	32.2	5 - 59
Winter,					
Hood River,					
1993	38,034	12,203	5,740 - 18,666	32.1	15 - 49
1994	42,860	11,089[c]	*d* - 27,655	25.9	*d* - 65
1995	44,909	32,928[c]	23,021 - 42,835	73.3	51 - 95
1996	59,837	48,867[c]	33,392 - 64,342	81.7	56 - 100
1997	62,135	52,412	40,273 - 64,551	84.4	65 - 100
1998	42,675	39,744	29,906 - 49,582	93.1	70 - 100
1999	60,403	51,493	39,688 - 63,298	85.2	66 - 100
2000	50,623	27,482[e]	11,465 - 43,499	54.3	23 - 86

[a] Estimate represents numbers released above the mainstem migrant trap. A small percentage of non-migrants remaining in the acclimation ponds may have been released below the mainstem migrant trap beginning with the 1998 brood Hood River stock summer steelhead release and the 1995 brood Hood River stock winter steelhead release.

[b] The 1996 brood release of Foster stock hatchery summer steelhead smolts was the last brood release of a non-indigenous summer steelhead stock above Powerdale Dam (i.e., the mainstem migrant trap).

[c] Estimate based on the mark:recapture ratio for wild downstream migrant steelhead (*see* **HATCHERY PRODUCTION, Post-Release Survival**).

[d] Value computes to less than zero.

[e] Number may significantly underestimate downstream migrants to the mainstem migrant trap. The mainstem migrant trap had to be pulled for one to four days subsequent to both of the primary smolt production releases. The trap was pulled because of significant high water events.

Table 112. Estimates of mean fork length (FL; mm), weight (gm), and condition factor (CF) for Hood River stock hatchery summer steelhead smolts sampled at Oak Springs Hatchery prior to being transferred to the Hood River subbasin[a]. Estimates are for early- and late- release groups.

Statistic, release group, brood year	N	Mean	Range	95% C.I.
FL (mm),				
Early,				
1998[b]	246	189.6	109 - 235	± 2.2
1999	201	188.0	122 - 247	± 2.6
2000	220	169.6	87 - 223	± 3.7
Late,				
1998	--			
1999	201	201.7	133 - 249	± 2.3
2000	145	183.1	96 - 256	± 5.4
Weight (gm),				
Early,				
1998[b]	244	82.4	12.8 - 152.4	± 2.8
1999	201	72.1	19.5 - 178.6	± 3.1
2000	220	56.4	6.8 - 129.3	± 3.5
Late,				
1998	--			
1999	201	85.0	29.1 - 185.2	± 3.0
2000	144	74.8	8.6 - 194.0	± 6.4
CF,[c]				
Early,				
1998[b]	244	1.17	0.84 - 1.37	± 0.009
1999	201	1.05	0.79 - 1.35	± 0.008
2000	220	1.06	0.73 - 1.26	± 0.01
Late,				
1998	--			
1999	201	1.02	0.87 - 1.24	± 0.008
2000	144	1.10	0.76 - 1.31	± 0.01

[a] Juveniles were sampled approximately one to seven days prior to transfer.
[b] Juveniles were sampled two weeks prior to transfer in mid-April.
[c] Condition factor was estimated as (100*weight(gm)/length(cm)^3).

Table 113. Estimates of mean fork length (FL; mm), weight (gm), and condition factor (CF) for Hood River stock hatchery winter steelhead smolts sampled at Oak Springs Hatchery prior to being transferred to the Hood River subbasin[a]. Estimates are for early-, late-, and June- release groups which were ponded separately at the hatchery (*see* **HATCHERY PRODUCTION, Size and Weight**)

Statistic, release group, brood year	Size group	N	Mean	Range	95% C.I.
FL (mm),					
June,					
1993[b]	--	130	183.8	115 - 234	± 4.2
Early,					
1993	Large	185	200.2	144 - 246	± 2.9
1993	Small	193	192.7	82 - 283	± 3.9
1994	Large	200	196.9	138 - 247	± 2.5
1994	Small	207	185.7	116 - 234	± 2.7
1995	Large	208	196.1	93 - 236	± 2.6
1996	Large	203	196.5	118 - 242	± 2.5
1997	Large	199	193.1	91 - 240	± 2.9
1998	Large	200	189.2	125 - 232	± 2.3
1999	Large	208	181.0	117 - 228	± 2.6
Late,					
1995[c]	--	--	--	--	--
1996	Small	192	168.2	90 - 225	± 3.7
1997	Small	205	173.8	89 - 218	± 3.1
1998	Small	195	194.9	92 - 268	± 3.6
1999	Small	196	180.6	119 - 224	± 2.7
2000	Large	195	198.2	134 - 242	± 3.0
2000	Small	203	182.3	98 - 244	± 3.4
Weight (gm),					
June,					
1993[b]	--	129	69.5	16.0 - 145.5	± 4.8
Early,					
1993	Large	185	91.1	33.1 - 168.5	± 3.8
1993	Small	192	87.2	6.1 - 236.4	± 4.6
1994	Large	199	86.2	29.6 - 172.1	± 3.2
1994	Small	207	72.8	16.5 - 154.0	± 3.1
1995	Large	205	89.6	8.7 - 163.5	± 3.1
1996	Large	202	86.0	18.1 - 164.3	± 3.2
1997	Large	198	88.7	9.9 - 191.1	± 3.5
1998	Large	200	76.2	21.7 - 145.4	± 2.8
1999	Large	208	64.9	16.4 - 133.3	± 3.0
Late,					
1995[c]	--	--	--	--	--

Table 113. Continued.

Statistic, release group, brood year	Size group	N	Mean	Range	95% C.I.
Weight (gm),					
Late, (cont.)					
1996	Small	191	53.4	5.7 - 109.8	± 3.3
1997	Small	202	60.7	7.3 - 115.8	± 2.9
1998	Small	195	84.1	7.9 - 190.1	± 4.3
1999	Small	195	62.9	17.4 - 134.3	± 2.8
2000	Large	192	89.8	26.1 - 176.0	± 3.7
2000	Small	202	73.4	13.5 - 164.6	± 3.8
CF,[d]					
June,					
1993[b]	--	129	1.06	0.88 - 1.22	± 0.01
Early,					
1993	Large	185	1.10	0.93 - 1.31	± 0.009
1993	Small	192	1.15	0.97 - 1.35	± 0.01
1994	Large	199	1.10	0.97 - 1.24	± 0.007
1994	Small	207	1.10	0.94 - 1.25	± 0.007
1995	Large	205	1.16	0.95 - 1.37	± 0.01
1996	Large	202	1.10	0.91 - 1.39	± 0.01
1997	Large	198	1.19	1.02 - 1.39	± 0.01
1998	Large	200	1.10	0.97 - 1.31	± 0.008
1999	Large	208	1.06	0.85 - 1.50	± 0.01
Late,					
1995[c]	--	--	--	--	--
1996	Small	191	1.04	0.63 - 1.67	± 0.01
1997	Small	202	1.10	0.90 - 1.35	± 0.009
1998	Small	195	1.09	0.76 - 1.24	± 0.01
1999	Small	195	1.04	0.69 - 1.29	± 0.01
2000	Large	192	1.13	0.94 - 1.50	± 0.01
2000	Small	202	1.16	0.79 - 1.43	± 0.01

[a] Juveniles were sampled approximately one to seven days prior to transfer.

[b] Juveniles were sampled four days prior to release on 28 June 1994.

[c] No juveniles were sampled from this brood release.

[d] Condition factor was estimated as $(100*\text{weight(gm)}/\text{length(cm)}^3)$.

Table 114. Estimates of mean fork length (FL; mm), weight (gm), and condition factor (CF) for downstream migrant hatchery summer and winter steelhead released into the Hood River subbasin (*see* **HATCHERY PRODUCTION, Production Releases**) and sampled at the mainstem migrant trap prior to 1 August.

Race/species, statistic, brood	Sampling period	N	Mean	Range	95% C.I.
Summer steelhead,[a]					
FL (mm),					
1994	04/12-07/06/95	581	208.4	103 - 248	± 1.3
1995	04/06-07/05/96	245	205.0	110 - 258	± 2.3
1996	04/12-06/30/97	331	209.4	124 - 255	± 2.0
1997	--	*b*			
1998	04/16-07/28/99	422	204.2	129 - 262	± 1.5
1999	04/17-07/15/00	577	202.8	112 - 255	± 1.3
2000	04/13-07/27/01	230	198.0	156 - 256	± 2.4
Weight (gm),					
1994	04/12-07/06/95	574	89.1	25.9 - 154.8	± 1.7
1995	04/06-07/05/96	238	82.3	34.7 - 160.6	± 2.5
1996	04/12-06/30/97	327	90.9	41.1 - 171.0	± 2.6
1997	--	*b*			
1998	04/16-07/28/99	415	86.3	33.0 - 197.7	± 2.0
1999	04/17-07/15/00	574	80.3	38.4 - 170.2	± 1.6
2000	04/13-07/27/01	226	75.4	37.0 - 158.3	± 2.9
CF,[c]					
1994	04/12-07/06/95	574	0.97	0.70 - 1.21	± 0.006
1995	04/06-07/05/96	238	0.92	0.53 - 1.18	± 0.01
1996	04/12-06/30/97	327	0.97	0.61 - 1.56	± 0.009
1997	--	*b*			
1998	04/16-07/28/99	415	0.99	0.83 - 1.26	± 0.007
1999	04/17-07/15/00	573	0.94	0.61 - 1.23	± 0.004
2000	04/13-07/27/01	226	0.94	0.66 - 1.13	± 0.009
Winter steelhead,[d]					
FL (mm),					
1994	04/20-07/04/95	393	208.1	152 - 261	± 1.5
1995	04/15-07/05/96	304	205.7	151 - 247	± 1.8
1996	04/24-07/07/97	652	191.6	151 - 264	± 1.2
1997	04/16-06/26/98	1,601	201.5	146 - 267	± 0.8
1998	04/16-07/02/99	737	204.0	154 - 261	± 1.1
1999	04/13-07/03/00	697	194.6	105 - 259	± 1.2
2000	04/26-07/16/01	378	203.3	161 - 298	± 1.8
Weight (gm),					
1994	04/20-07/04/95	384	89.4	29.8 - 198.6	± 2.2
1995	04/15-07/05/96	274	84.7	34.7 - 135.7	± 2.3

Table 114. Continued.

Race/species, statistic, brood	Sampling period	N	Mean	Range	95% C.I.
Winter steelhead,[d]					
Weight (gm), (cont.)					
1996	04/24-07/07/97	647	71.3	32.2 - 205.2	± 1.5
1997	04/16-06/26/98	1,537	79.8	30.5 - 159.2	± 1.0
1998	04/16-07/02/99	730	86.6	34.3 - 183.2	± 1.5
1999	04/13-07/03/00	688	71.6	13.3 - 154.8	± 1.4
2000	04/26-07/16/01	357	87.1	45.2 - 184.3	± 2.3
CF,[c]					
1994	04/20-07/04/95	384	0.98	0.77 - 1.31	± 0.007
1995	04/15-07/05/96	274	0.96	0.80 - 1.28	± 0.008
1996	04/24-07/07/97	647	0.99	0.57 - 1.30	± 0.006
1997	04/16-06/26/98	1,537	0.96	0.65 - 1.47	± 0.004
1998	04/16-07/02/99	730	1.00	0.76 - 1.41	± 0.005
1999	04/13-07/03/00	688	0.95	0.76 - 1.26	± 0.005
2000	04/26-07/16/01	357	1.03	0.84 - 1.41	± 0.008

[a] Hatchery production releases, prior to the 1998 brood release, were progeny of Foster stock summer steelhead. Only the progeny of Hood River stock summer steelhead were released above Powerdale Dam beginning with the 1998 brood release (*see* **HATCHERY PRODUCTION**).

[b] No hatchery summer steelhead smolts were released above the mainstem migrant trap. The Foster stock hatchery production group was released below Powerdale Dam (*see* **HATCHERY PRODUCTION**).

[c] Condition factor was estimated as (100*weight(gm)/length(cm)^3).

[d] Hood River stock.

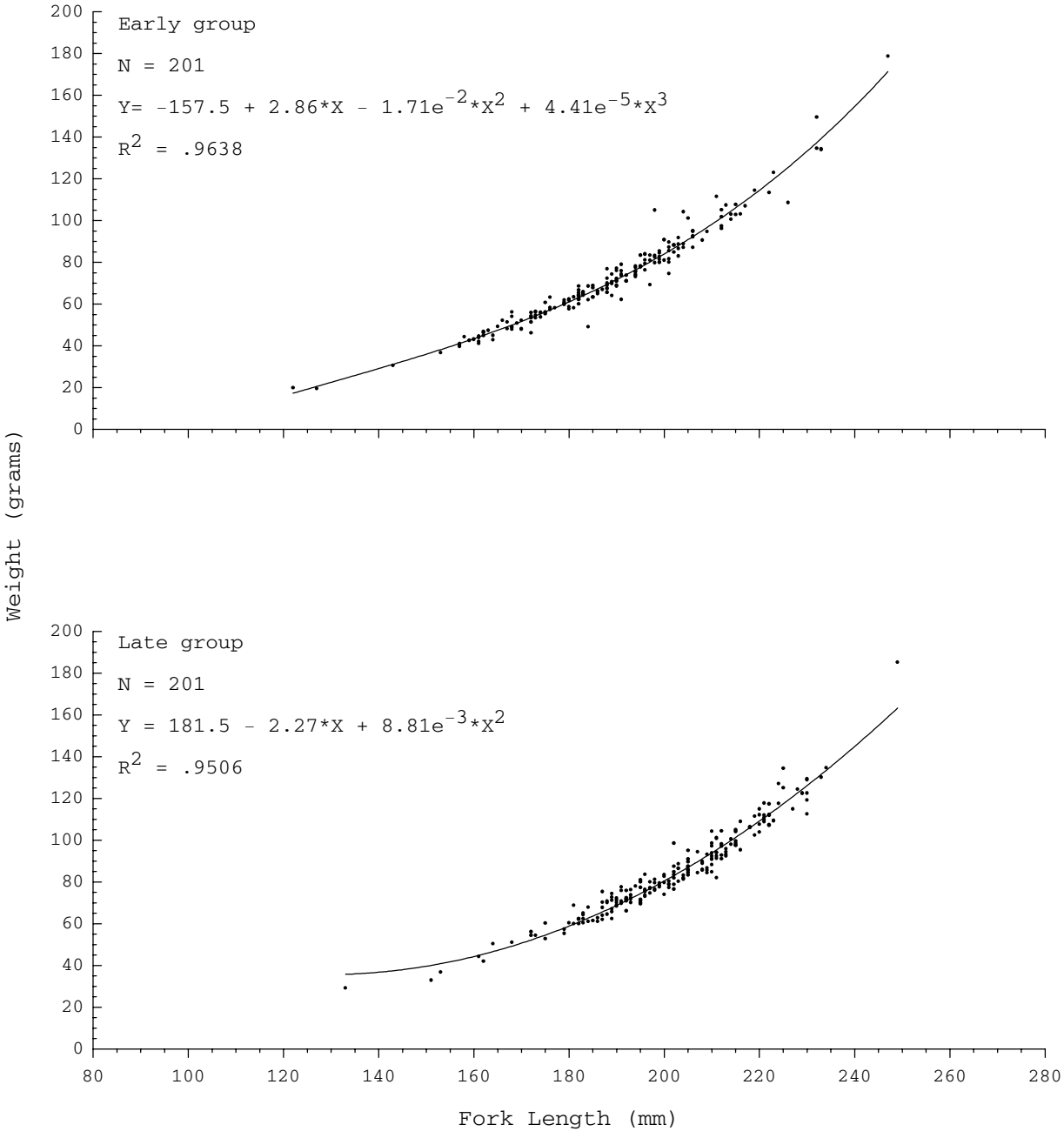

Figure 12. Length x weight regression of early- and late- release groups of Hood River stock hatchery summer steelhead smolts (1999 brood) released into the Hood River subbasin from Oak Springs Hatchery.

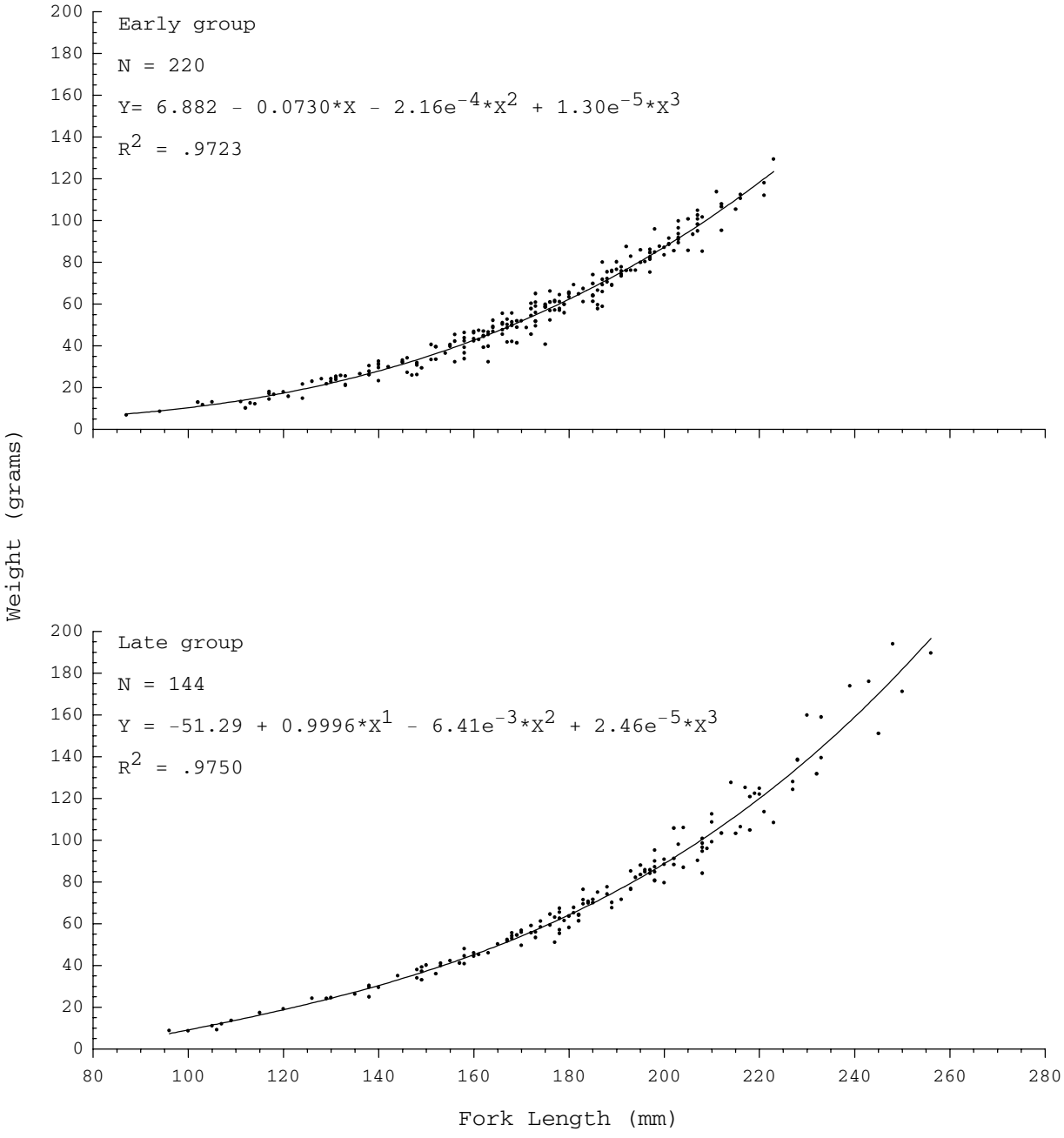

Figure 13. Length x weight regression of early- and late- release groups of Hood River stock hatchery summer steelhead smolts (2000 brood) released into the Hood River subbasin from Oak Springs Hatchery.

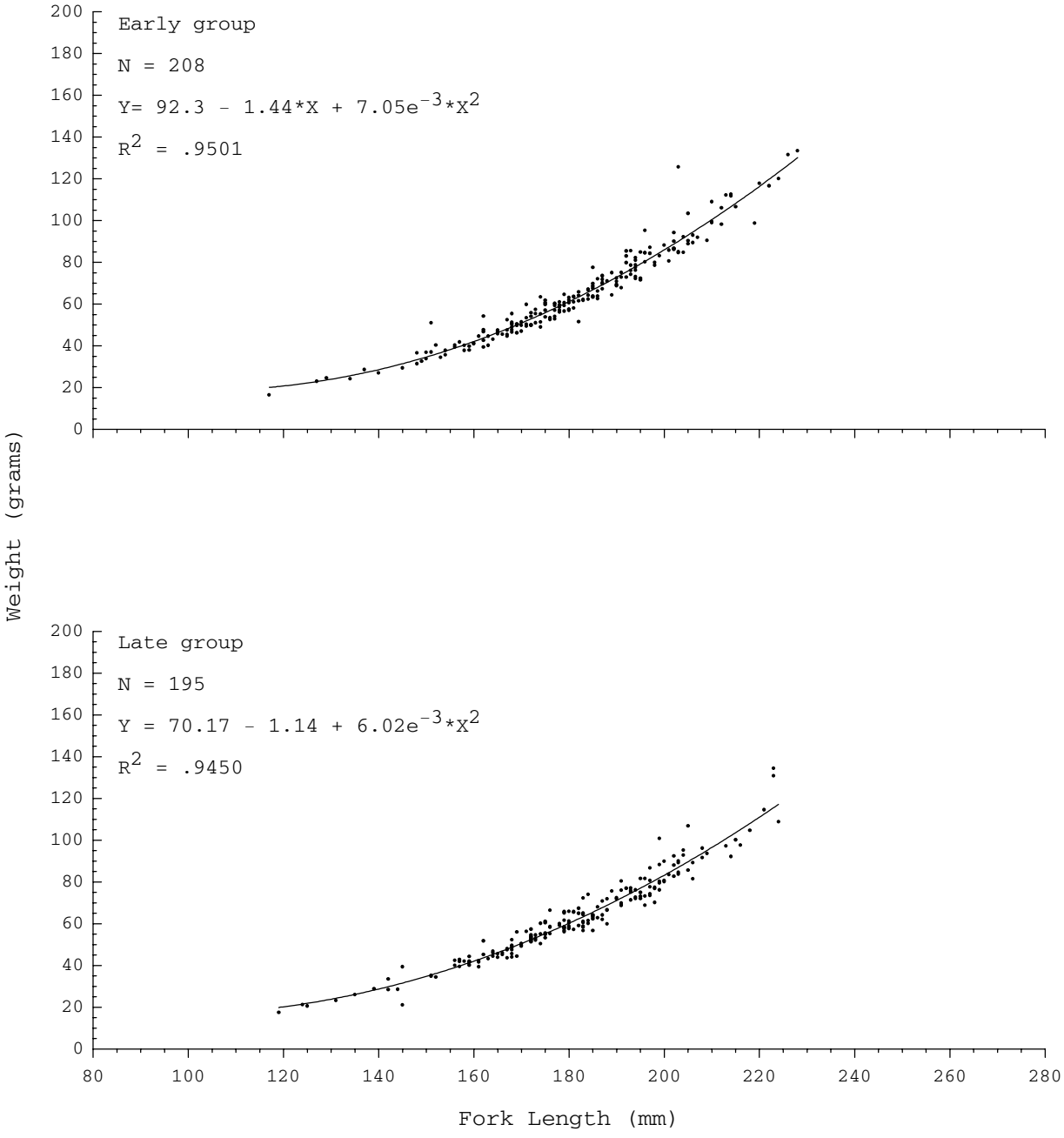

Figure 14. Length x weight regression of early- and late- release groups of Hood River stock hatchery winter steelhead smolts (1999 brood) released into the Hood River subbasin from Oak Springs Hatchery.

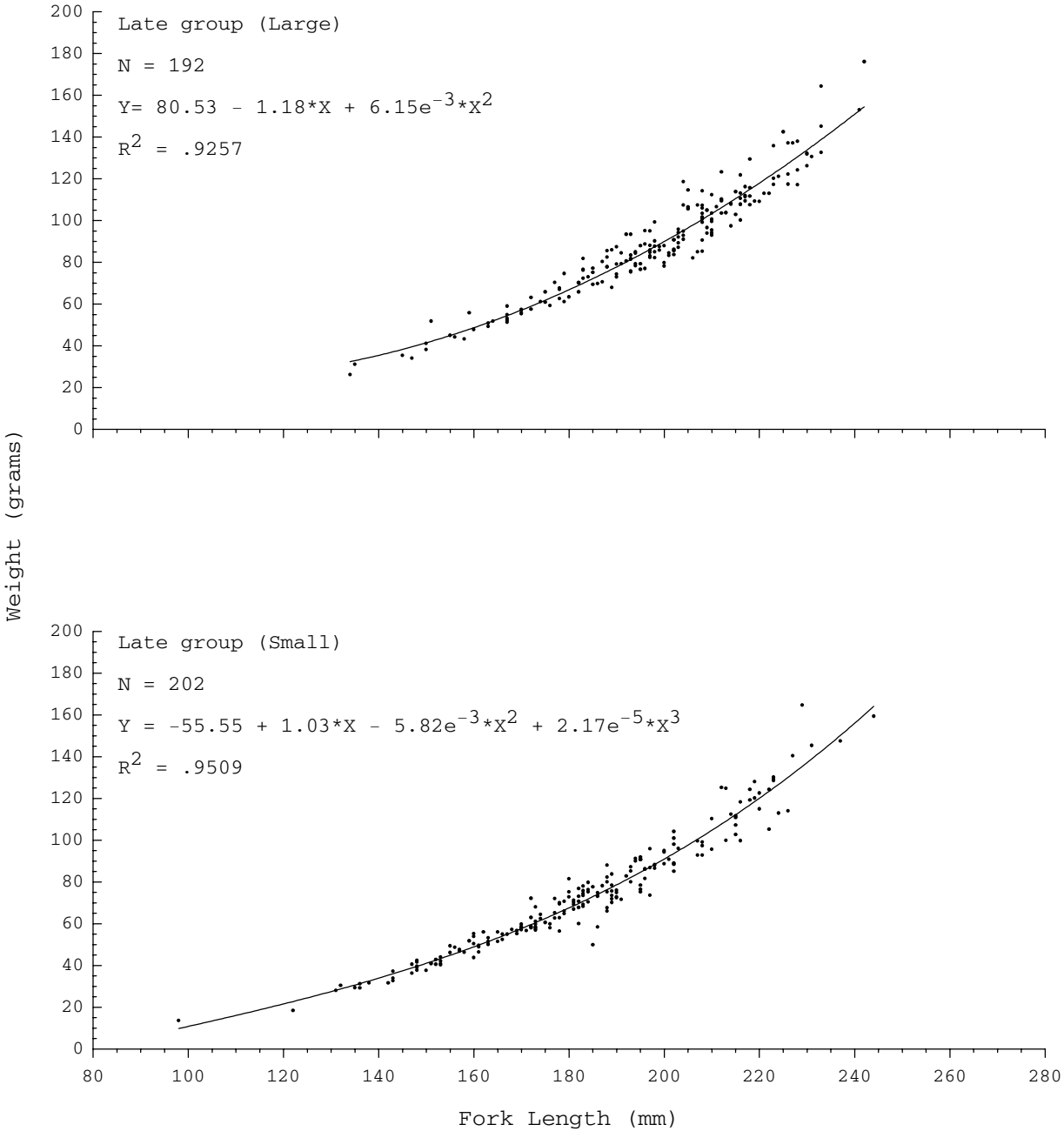

Figure 15. Length x weight regression of early- and late- release groups of Hood River stock hatchery winter steelhead smolts (2000 brood) released into the Hood River subbasin from Oak Springs Hatchery.

Table 115. In-stream water right in the East Fork Hood River (River Mile 1).

Period	Flow (cfs)
1 October - 31 December	150
1 January - 31 March	100
1 April - 30 June	150
1 July - 30 September	100

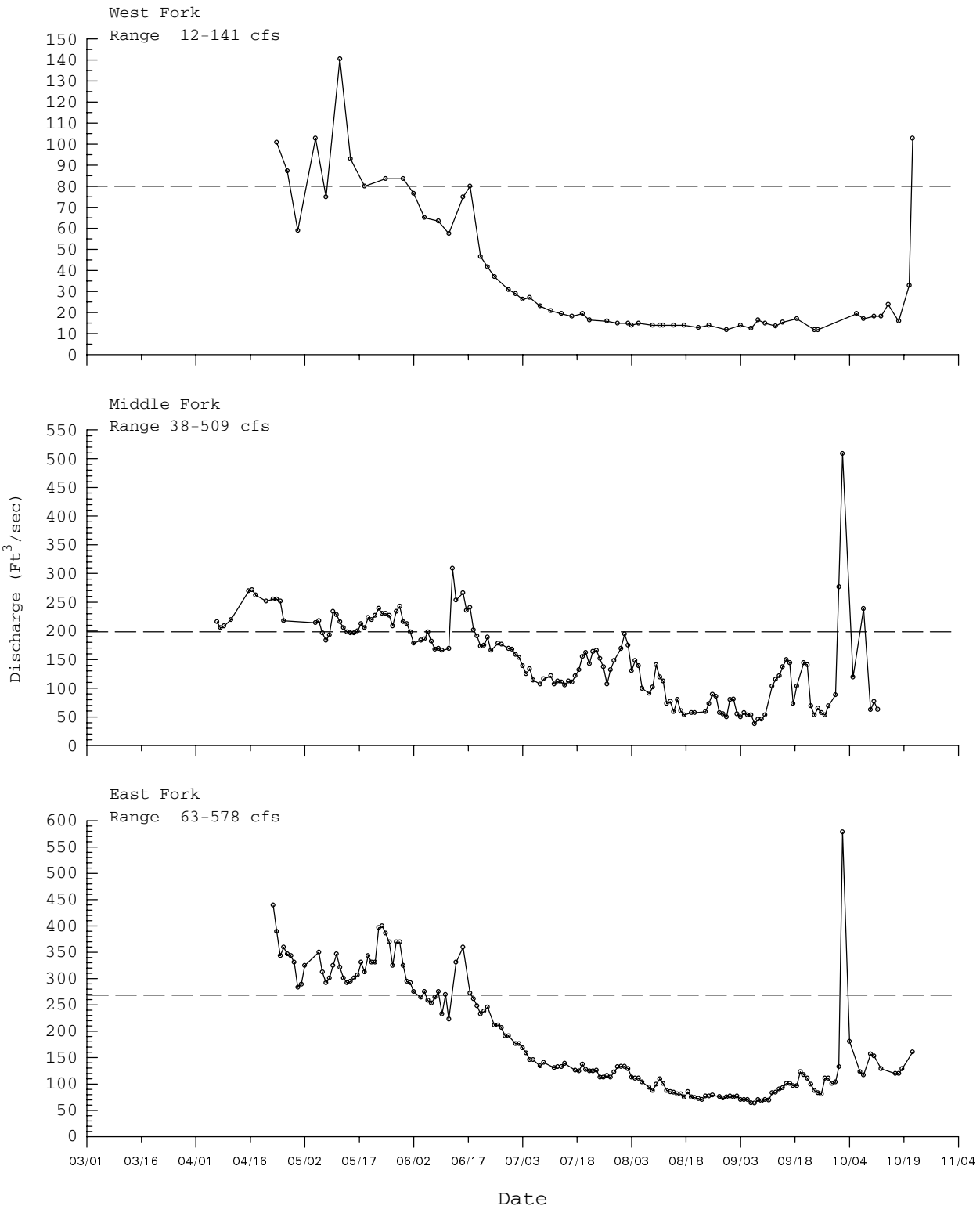

Figure 16. Streamflows in the West, Middle, and East forks of the Hood River, 2000. Streamflows above the dashed line were extrapolated from the calibration curve used to estimate streamflow from the staff gauge readings.

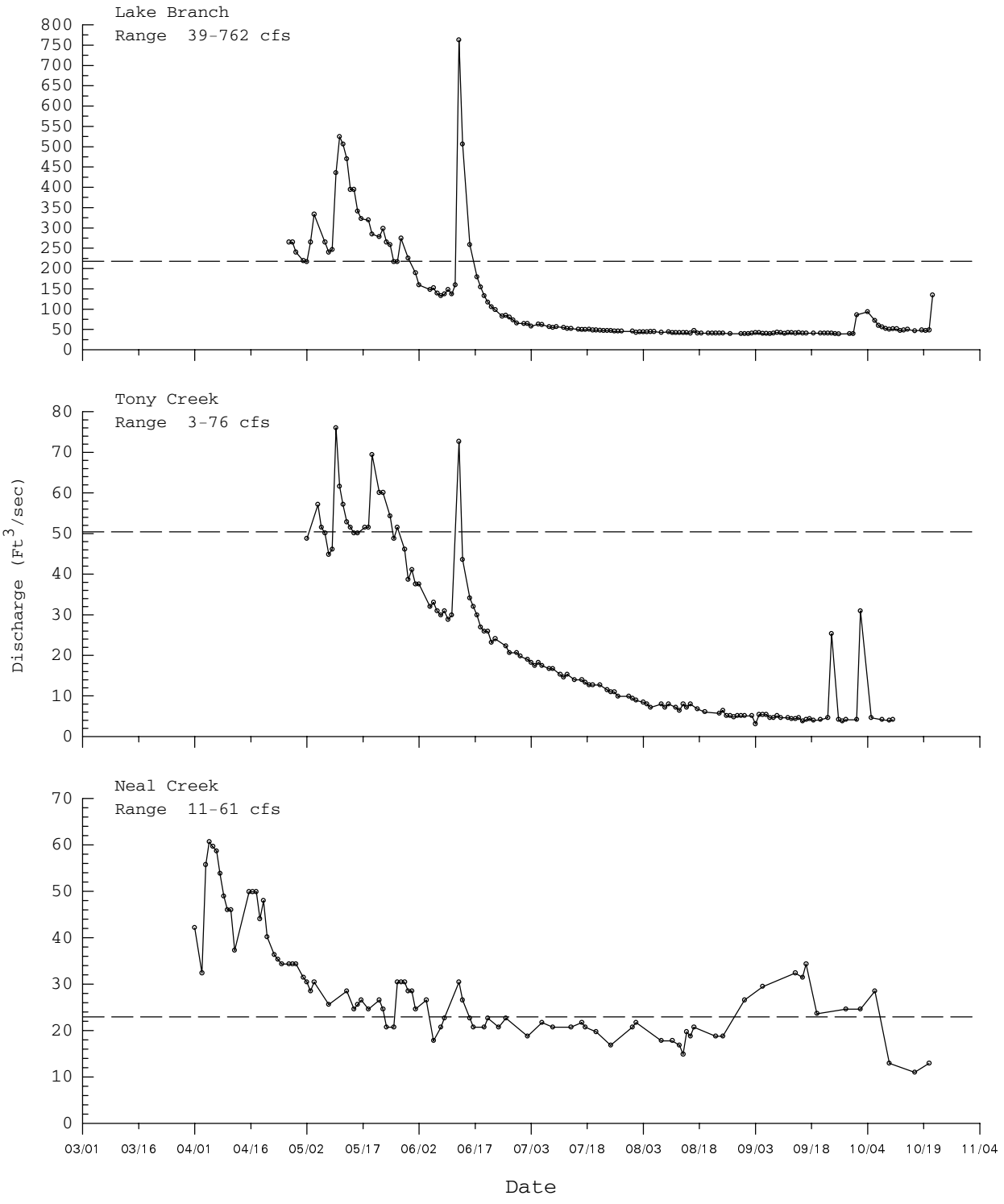

Figure 17. Streamflows in Lake Branch and Tony Creek, which are tributaries to the West and Middle forks of the Hood River, respectively, and in Neal Creek, which is a tributary to the mainstem of the Hood River, 2000. Streamflows above the dashed line were extrapolated from the calibration curve used to estimate streamflow from the staff gauge readings.

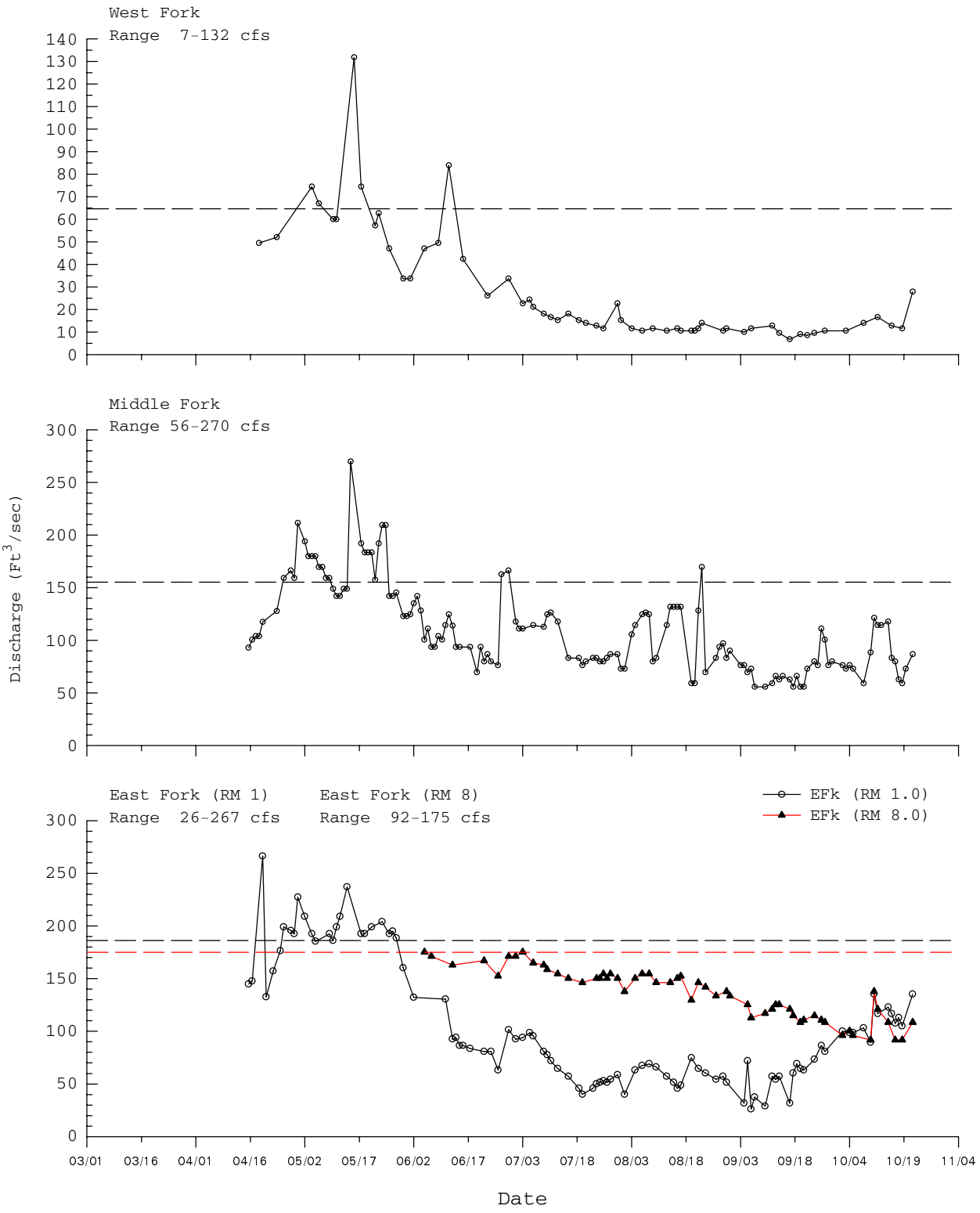

Figure 18. Streamflows in the West, Middle, and East forks of the Hood River, 2001. Streamflows above the dashed line were extrapolated from the calibration curve used to estimate streamflow from the staff gauge readings.

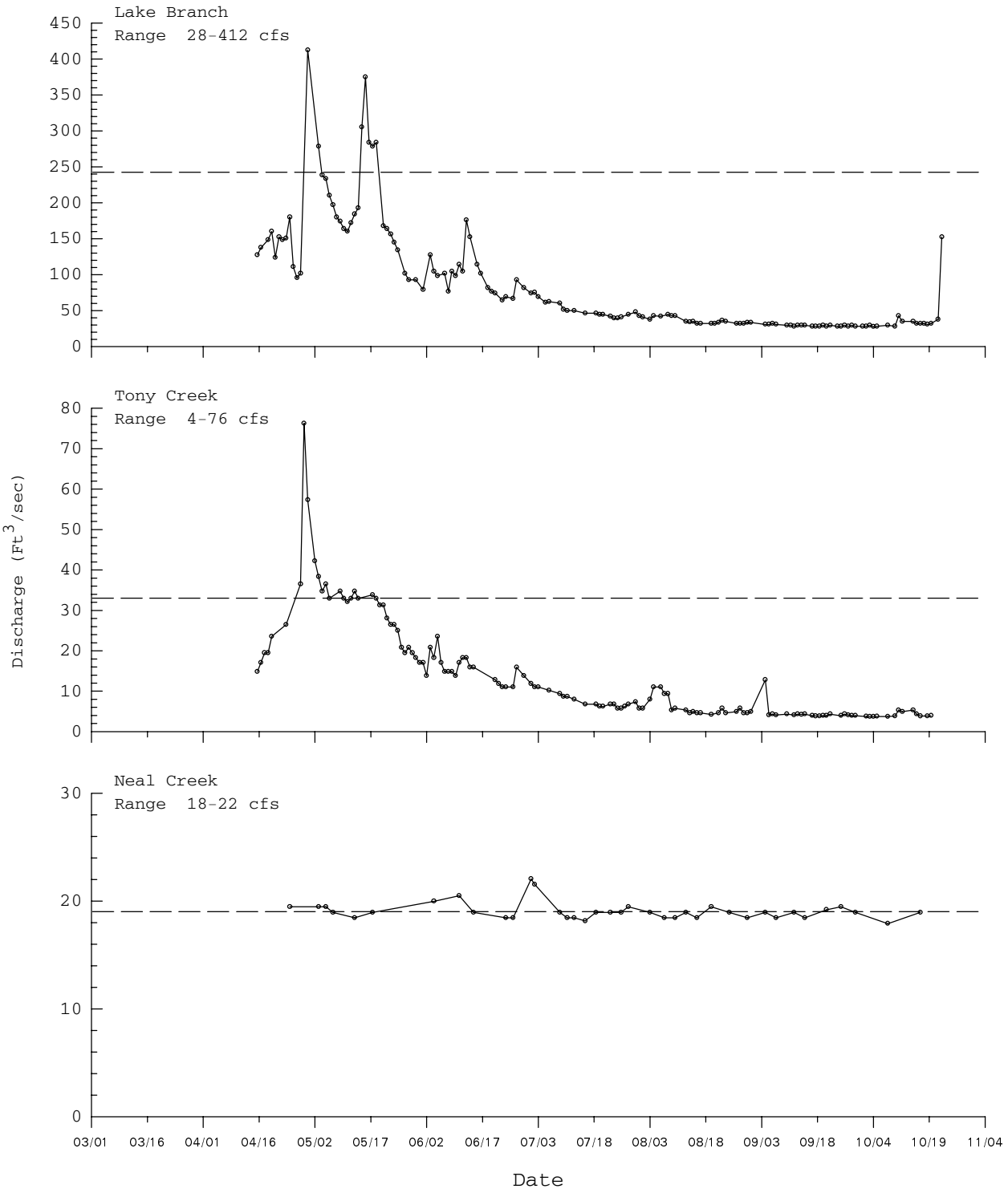

Figure 19. Streamflows in Lake Branch and Tony Creek, which are tributaries to the West and Middle forks of the Hood River, respectively, and in Neal Creek, which is a tributary to the mainstem of the Hood River, 2001. Streamflows above the dashed line were extrapolated from the calibration curve used to estimate streamflow from the staff gauge readings.

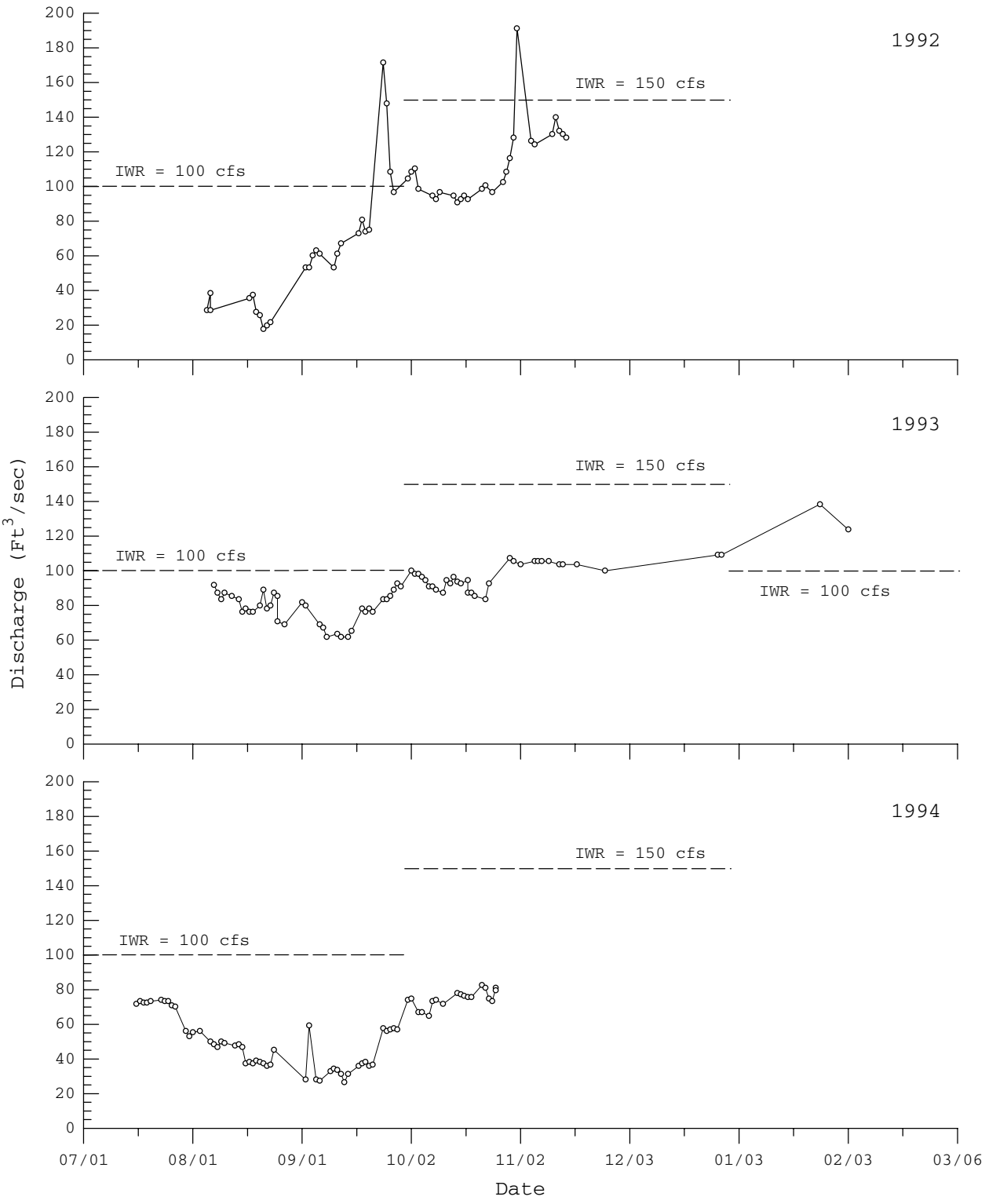

Figure 20. Streamflows in the East Fork Hood River at the measuring site for the in-stream water right (IWR), 1992-1994.

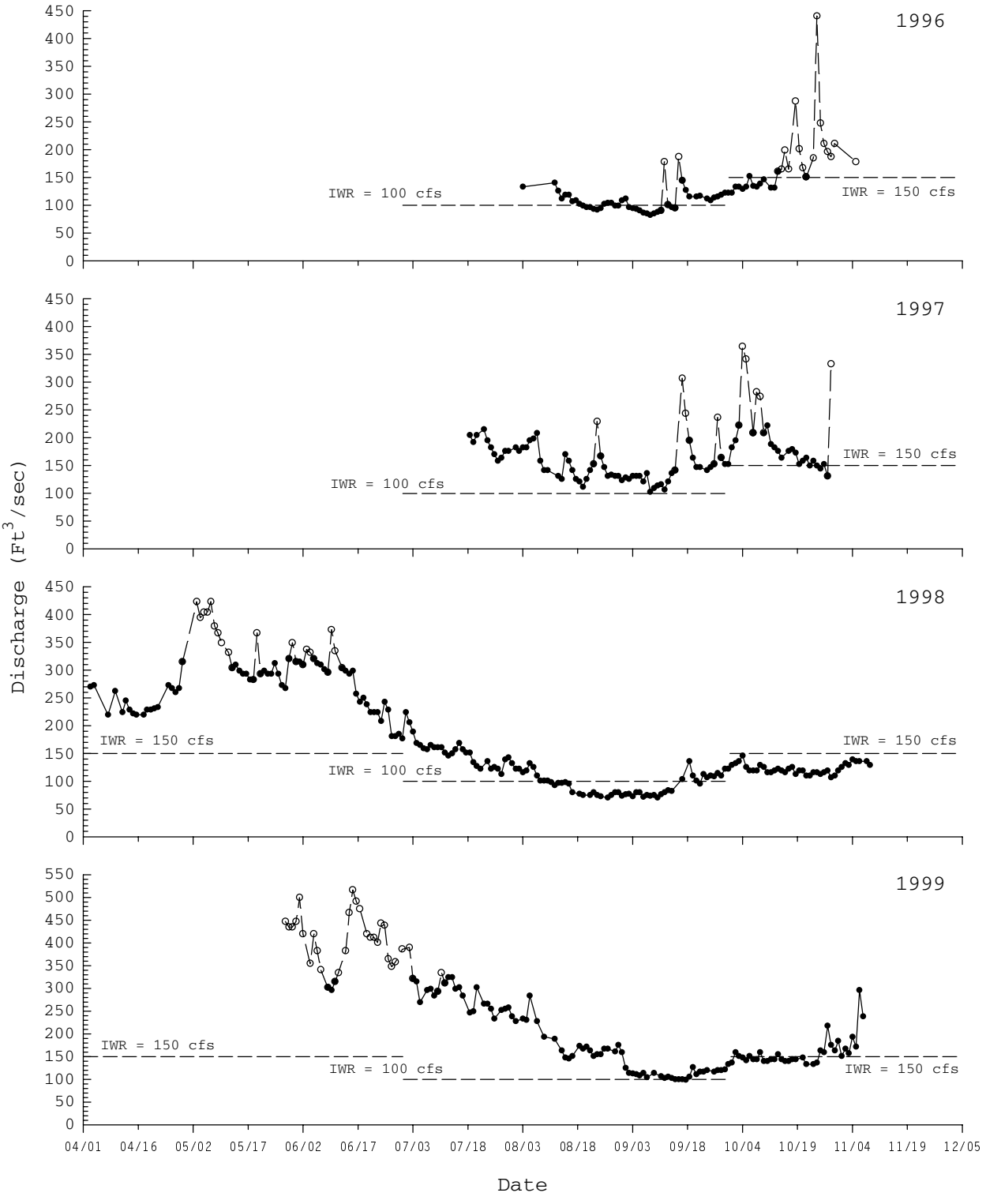

Figure 21. Streamflows in the East Fork Hood River at the measuring site for the in-stream water right (IWR), 1996-1999. Streamflows identified by "o" were extrapolated from the calibration curve used to estimate streamflow from the staff gauge readings.

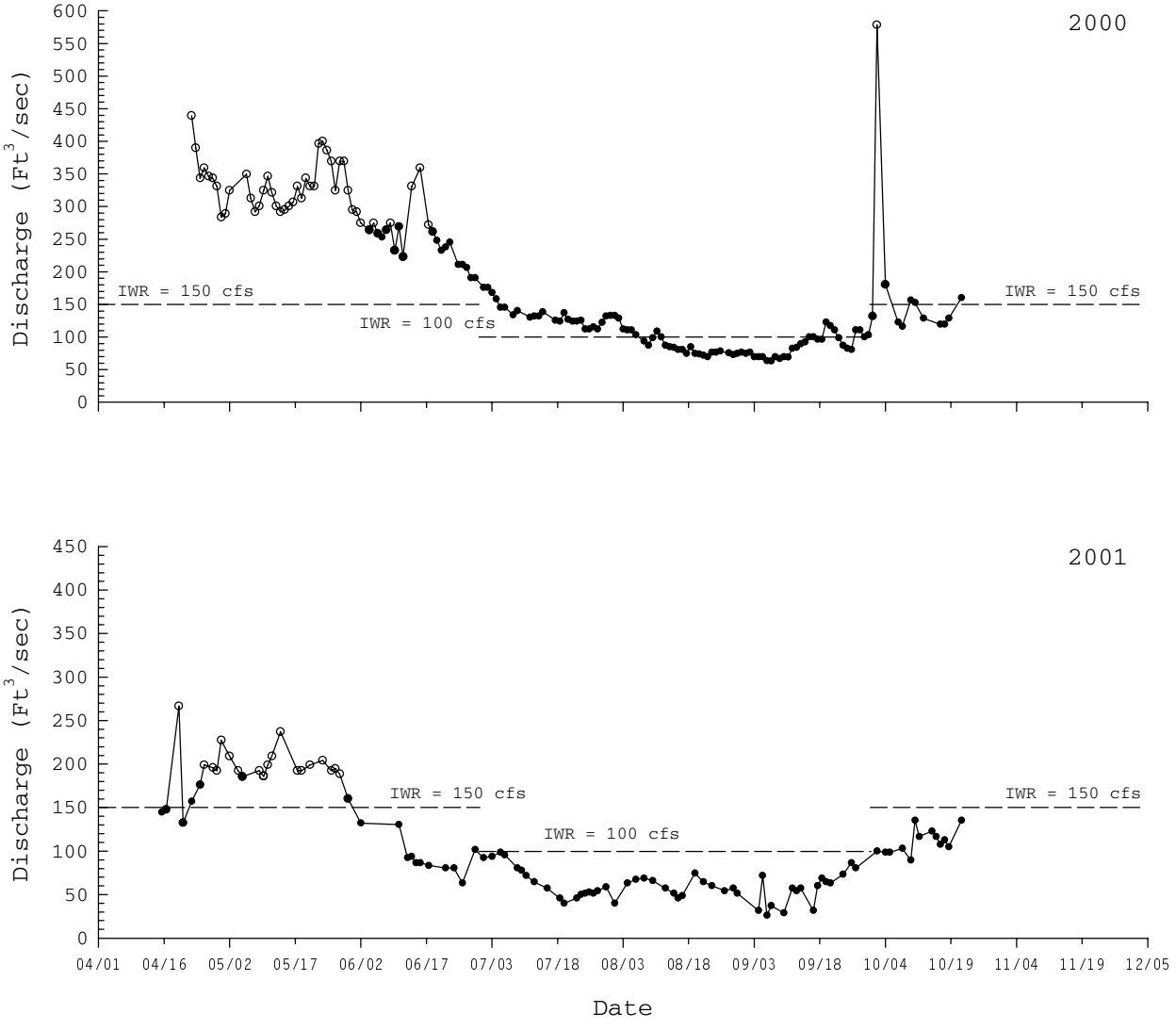

Figure 22. Streamflows in the East Fork Hood River at the measuring site for the in-stream water right (IWR), 2000-2001. Streamflows identified by "o" were extrapolated from the calibration curve used to estimate streamflow from the staff gauge readings.

ACKNOWLEDGMENTS

We sincerely appreciate the many persons who helped complete this report. Special thanks to Jim Newton and Steve Pribyl of the ODFW, Mid-Columbia fisheries district, for both the operation and maintenance of the Powerdale Dam trap and for supervision of field personnel operating the Powerdale Dam trap. We thank them for their insight and guidance throughout the study. We also thank trap operators Terry Guisto and Bryon Arrington for working many long hours in keeping the Powerdale Dam trap operational. We gratefully appreciate the contributions of scale readers Lisa Borgerson, Ken Kenaston, and Glen Davenport. We would also like to thank PacifiCorp for allowing us to operate an adult trapping facility at Powerdale Dam and to Steve Pribyl for editing drafts of the report. Finally, we would like to acknowledge the many hatchery and seasonal employees without whom we would know a lot less about indigenous populations of fish in the Hood River subbasin.

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APPENDIX A

Parameters Used to Estimate Rainbow-Steelhead Migrants to Rotary-Screw Traps Located in the Hood River Subbasin

Appendix Table A-1. Number of migrant wild rainbow-steelhead[a] and hatchery summer and winter steelhead marked (M), caught (C), and recaptured (R) at the mainstem migrant. Numbers marked at migrant traps located in the West, Middle, and East forks of the Hood River and subsequently recaptured at the mainstem migrant trap are in parenthesis.

Origin, race, year	Sampling period	M	C	R	Percent recapture
Wild,					
Unknown,[b]					
1994	03/23-07/31/94	346 (458)	412	14 (4)	4.0 (0.9)
1995	03/30-07/31/95	224 (353)	243	6 (5)	2.7 (1.4)
1996	04/03-07/31/96	572 (202)	656	42 (10)	7.3 (5.0)
1997	04/08-07/31/97	730 (666)	873	39 (19)	5.3 (2.9)
1998	04/03-07/31/98	1,235 (471)	1,380	54 (9)	4.4 (1.9)
1999	04/08-07/31/99	1,029 (609)	1,138	48 (11)	4.7 (1.8)
2000	04/05-07/31/00	1,183 (395)	1,317	80 (33)	6.8 (8.4)
2001	04/11-07/31/01	129 (89)	149	5 (0)	3.9 (0)
Hatchery,					
Summer,					
1994	03/23-07/31/94	1,110 (214)	1,410	41 (5)	3.7 (2.3)
1995	03/30-07/31/95	1,100 (1,296)	1,469	19 (9)	1.7 (0.7)
1996	04/03-07/31/96	1,083 (1,022)	2,119	42 (27)	3.9 (2.6)
1997	04/08-07/31/97	788 (110)	1,616	24 (0)	3.0 (0)
1998[c]	04/03-07/31/98	4 (12)	5	0 (1)	0 (8.3)
1999	04/08-07/31/99	660 (6)	773	38 (0)	5.8 (0)
2000	04/05-07/31/00	1,012 (12)	1,388	55 (0)	5.4 (0)
2001	04/11-07/31/01	243 (82)	303	7 (0)	2.9 (0)
Winter,					
1994	03/23-07/31/94	430 (685)	452	15 (6)	3.5 (0.9)
1995	03/30-07/31/95	459 (1,261)	500	3 (23)	0.7 (1.8)
1996	04/03-07/31/96	1,155 (693)	2,480	52 (37)	4.5 (5.3)
1997	04/08-07/31/97	1,157 (374)	2,663	29 (7)	2.5 (1.9)
1998	04/03-07/31/98	1,769 (322)	2,131	71 (9)	4.0 (2.8)
1999	04/08-07/31/99	1,371 (667)	1,824	62 (17)	4.5 (2.5)
2000	04/05-07/31/00	1,358 (1)	2,765	72 (0)	5.3 (0)
2001	04/11-07/31/01	551 (97)	696	13 (0)	2.4 (0)

[a] Numbers are for downstream migrants greater than or equal to 150 mm fork length.

[b] Race unknown. May include wild summer and winter steelhead and wild rainbow trout.

[c] No hatchery summer steelhead smolts were released above the mainstem migrant trap. Numbers represent residual summer steelhead smolts released in prior years.

Appendix Table A-2. Number of migrant wild rainbow-steelhead greater than or equal to 150 mm fork length that were marked (M), caught (C), and recaptured (R) at downstream migrant traps located in the West, Middle, and East forks of the Hood River and in Lake Branch and Green Point Creek; both of which are tributaries to the West Fork of the Hood River.

Location, year	Sampling period	M	C	R	Percent recapture
West Fork,[a]					
1994	03/25-07/31/94	225	266	16	7.1
1995	03/22-07/31/95	114	122	9	7.9
1996	04/03-07/31/96	70	80	5	7.1
1997[b]	04/08-07/31/97	110 (56)	118	1 (3)	0.9 (5.4)
1998[b]	03/26-07/31/98	152 (92)	169	6 (1)	3.9 (1.1)
1999[b]	04/03-07/31/99	120 (149)	134	7 (5)	5.8 (3.4)
2000[b]	04/05-07/31/00	148 (35)	188	15 (1)	10.1 (2.9)
2001[b]	04/16-07/31/01	90[c] (0)	21	2[c] (0)	2.2 (0)
Middle Fork,[d]					
1995	03/21-07/31/95	117	129	12	10.3
1996	04/11-07/31/96	104	119	11	10.6
1997	04/08-07/31/97	302	343	38	12.6
1998	03/25-07/31/98	217[e]	131	13[e]	6.0
1999	04/03-07/31/99	392[f]	114	13[f]	3.3
2000	04/07-07/31/00	26	27	1	3.8
2001	04/12-07/31/01	126[f]	32	2[f]	1.6
East Fork,[d]					
1994	04/02-07/31/94	235	287	41	17.4
1995	03/17-07/31/95	127	138	7	5.5
1996	04/03-07/31/96	28	32	0	--
1997	04/08-07/31/97	198	243	30	15.2
1998	03/19-07/31/98	110	134	7	6.4
1999	04/10-07/31/99	206	222	13	6.3
2000	04/13-07/31/00	171	190	10	5.8
Green Point Creek,[a]					
1998	05/22-07/31/98	11	12	1	9.1
1999	04/15-07/31/99	37	50	6	16.2
2000	04/19-07/31/00	143[g]	35	17[g]	11.9
2001	04/20-07/31/01	25	30	4	16.0
Lake Branch,[a]					
1997	04/08-07/31/97	56	59	3	5.4
1998	03/31-07/31/98	92	99	6	6.5
1999	04/08-07/31/99	149	178	28[h]	18.8
2000	04/14-07/31/00	35	44	8[h]	22.9
2001	04/11-07/31/01	26	31	3	11.5

Appendix Table A-2. Continued.

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[a] Downstream migrants sampled in the West Fork Hood River drainage may include both wild summer steelhead and wild rainbow trout.

[b] Numbers marked at the migrant trap located in Lake Branch and subsequently recaptured at the West Fork migrant trap are in parenthesis.

[c] Number includes downstream migrant wild steelhead (i.e., migrants ≥150 mm fork length) and hatchery summer steelhead.

[d] Downstream migrants sampled in the Middle and East forks of the Hood River may include wild winter steelhead, wild rainbow trout, and limited numbers of mis-identified wild cutthroat trout.

[e] Number includes all downstream migrant wild steelhead (i.e., migrants <150 mm fork length and migrants ≥150 mm fork length) and downstream migrant bull trout.

[f] Number includes wild steelhead (i.e., migrants ≥150 mm fork length) and hatchery winter steelhead.

[g] Number includes all downstream migrant wild steelhead (i.e., migrants <150 mm fork length and migrants ≥150 mm fork length).

[h] Number includes juveniles marked prior to 1 August and later recaptured in August. One marked fish was caught on 4 August in 1999 and three marked fish were caught prior to 8 August in 2000.

APPENDIX B

Disposition of Adult Summer Steelhead Collected at Powerdale Dam

Appendix Table B-1. Bi-weekly disposition of adult summer steelhead collected at the Powerdale Dam adult trap from the 1999-2000 run year. Counts of wild and hatchery adults may include marked and unmarked summer steelhead, respectively; origin was determined based on a combination of hatchery mark and scale analysis (*see* **METHODS**). Adult steelhead were allocated to a given category based on disposition at time of first entry to the adult trap. Adult steelhead collected for hatchery broodstock, as well as recycled adults returning to the adult trap, may subsequently have been re-released either above or below Powerdale Dam or become a mortality.

	Returns to Powerdale Dam		Broodstock collection[a]				Numbers passed above Powerdale Dam		Numbers recycled below Powerdale Dam		Mortalities[b]		Transfers[c]	
			By origin		By sex									
Period	Wild	Hatchery	Wild	Hatchery	Males	Females	Wild	Hatchery	Wild[d]	Hatchery[e]	Wild	Hatchery	Wild	Hatchery
Apr 1-15	1	3	1	--	--	1	--	--	--	3	--	--	--	--
Apr 16-30	--	9	--	--	--	--	--	--	--	9	--	--	--	--
May 1-15	1	2	1	--	--	1	--	--	--	2	--	--	--	--
May 16-31	5	32	2	--	2	--	3	--	--	31	--	1	--	--
Jun 1-15	8	21	--	--	--	--	7	--	1	21(2)	--	--	--	--
Jun 16-30	6	66	1	--	--	1	5	1	--	64(1)	--	1	--	--
Jul 1-15	20	86	4	--	2	2	16	--	--	86(1)	--	--	--	--
Jul 16-31	30	128	4	--	1	3	25	--	1	127	--	1	--	--
Aug 1-15	11	67	2	--	--	2	9	--	--	67	--	--	--	--
Aug 16-31	5	20	--	--	--	--	5	--	--	20(1)	--	--	--	--
Sep 1-15	--	3	--	--	--	--	--	--	--	3	--	--	--	--
Sep 16-30	9	3	4	--	2	2	4	--	1	2	--	1	--	--
Oct 1-15	8	7	1	--	--	1	7	--	--	7	--	--	--	--
Oct 16-31	3	2	1	--	--	1	2	--	--	2	--	--	--	--
Nov 1-15	37	11	6	--	2	4	30	--	1	11	--	--	--	--
Nov 16-30	9	2	1	--	--	1	8	--	--	2	--	--	--	--
Dec 1-15	7	4	2	--	--	2	5	1	--	3	--	--	--	--
Dec 16-31	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Jan 1-15	2	1	1	--	1	--	1	--	--	--	--	--	--	1
Jan 16-31	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb 1-15	4	2	--	--	--	--	4	--	--	--	--	1	--	1
Feb 16-29	1	2	--	--	--	--	1	--	--	--	--	1	--	1
Mar 1-15	1	7	--	--	--	--	1	--	--	--	--	7	--	--
Mar 16-31	2	2	1	--	1	--	1	--	--	--	--	2	--	--
Apr 1-15	11	5	1	--	1	--	7	--	2	5	1	--	--	--
Apr 16-30	5	2	--	--	--	--	5	--	--	2(2)	--	--	--	--
May 1-15	--	--	--	--	--	--	--	--	--	--	--	--	--	--
May 16-31	1	--	--	--	--	--	--	--	1	--	--	--	--	--
Totals	187	487	33	--	12	21	146	2	7	467(7)	1	15	--	3

[a] Pre-spawning mortalities are included in the totals and listed in parenthesis.
[b] Estimate does not include pre-spawning mortalities of hatchery broodstock.
[c] Adults were transferred to Kingsley Reservoir or Taylor Lake upon first return to Powerdale Dam.
[d] Numbers include marked adults which were classified as wild adults based on scale analysis.
[e] Recycled fish returning more than three times to Powerdale Dam may be killed (i.e., depending on the condition of the fish) or transferred to either Kingsley Reservoir or Taylor Lake. The total number of adults, falling into either of these three categories, are summarized in parenthesis and included in the total number of recycled fish.

Appendix Table B-2. Bi-weekly disposition of adult summer steelhead collected at the Powerdale Dam adult trap from the 2000-2001 run year. Counts of wild and hatchery adults may include marked and unmarked summer steelhead, respectively; origin was determined based on a combination of hatchery mark and scale analysis (*see* **METHODS**). Adult steelhead were allocated to a given category based on disposition at time of first entry to the adult trap. Adult steelhead collected for hatchery broodstock, as well as recycled adults returning to the adult trap, may subsequently have been re-released either above or below Powerdale Dam or become a mortality.

	Returns to Powerdale Dam		Broodstock collection[a]				Numbers passed above Powerdale Dam		Numbers recycled below Powerdale Dam		Mortalities[b]		Transfers[c]	
			By origin		By sex									
Period	Wild	Hatchery	Wild	Hatchery	Males	Females	Wild	Hatchery	Wild[d]	Hatchery[e]	Wild	Hatchery	Wild	Hatchery
Mar 1-15	--	2	--	--	--	--	--	--	--	2	--	--	--	--
Mar 16-31	--	11	--	--	--	--	--	--	--	11(1)	--	--	--	--
Apr 1-15	1	43	1(1)	--	--	1(1)	--	--	--	43(3)	--	--	--	--
Apr 16-30	3	71	1	--	1	--	2	--	--	71(7)	--	--	--	--
May 1-15	2	81	--	--	--	--	2	--	--	81(17)	--	--	--	--
May 16-31	13	180	1	--	--	1	11	--	1	180(34)	--	--	--	--
Jun 1-15	13	156	1	--	--	1	12	--	--	156(36)	--	--	--	--
Jun 16-30	41	235	5	--	2	3	34	--	2	228(46)	--	1	--	6
Jul 1-15	20	173	3	--	1	2	17	--	--	172(30)	--	1	--	--
Jul 16-31	23	113	2(1)	--	--	2(1)	21	1	--	111(4)	--	1	--	--
Aug 1-15	14	42	2	--	1	1	12	--	--	41(4)	--	1	--	--
Aug 16-31	9	27	2	--	1	1	7	--	--	27(4)	--	--	--	--
Sep 1-15	10	23	1	--	--	1	9	--	--	23(6)	--	--	--	--
Sep 16-30	26	14	3	--	2	1	19	--	3	14(6)	1	--	--	--
Oct 1-15	4	--	--	--	--	--	4	--	--	--	--	--	--	--
Oct 16-31	30	12	4(1)	--	2	2(1)	23	--	--	0	3	12	--	--
Nov 1-15	3	4	--	--	--	--	--	--	--	--	3	4	--	--
Nov 16-30	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 1-15	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec 16-31	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Jan 1-15	--	1	--	--	--	--	--	--	--	1	--	--	--	--
Jan 16-31	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb 1-15	1	--	--	--	--	--	--	--	--	--	1	--	--	--
Feb 16-28	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Mar 1-15	--	1	--	--	--	--	--	--	--	1	--	--	--	--
Mar 16-31	3	2	1	--	1	--	2	--	--	2(1)	--	--	--	--
Apr 1-15	2	2	--	--	--	--	2	--	--	2	--	--	--	--
Apr 16-30	--	1	--	--	--	--	--	--	--	1	--	--	--	--
Totals	218	1,194	27(3)	--	11	16(3)	177	1	6	1,167(199)	8	20	--	6

[a] Pre-spawning mortalities are included in the totals and listed in parenthesis.
[b] Estimate does not include pre-spawning mortalities of hatchery broodstock.
[c] Adults were transferred to Kingsley Reservoir or Taylor Lake upon first return to Powerdale Dam.
[d] Numbers include marked adults which were classified as wild adults based on scale analysis.
[e] Recycled fish returning more than three times to Powerdale Dam may be killed (i.e., depending on the condition of the fish) or transferred to either Kingsley Reservoir or Taylor Lake. The total number of adults, falling into either of these three categories, are summarized in parenthesis and included in the total number of recycled fish.

Appendix Table B-3. Preliminary estimate through 31 December, 2001 of the bi-weekly disposition of adult summer steelhead collected at the Powerdale Dam adult trap from the 2001-2002 run year. Counts of wild and hatchery adults may include marked and unmarked summer steelhead, respectively; origin was determined based on a combination of hatchery mark and scale analysis (*see* **METHODS**). Adult steelhead were allocated to a given category based on disposition at time of first entry to the adult trap. Adult steelhead collected for hatchery broodstock, as well as recycled adults returning to the adult trap, may subsequently have been re-released either above or below Powerdale Dam or become a mortality.

	Returns to Powerdale Dam		Broodstock collection[a]				Numbers passed above Powerdale Dam		Numbers recycled below Powerdale Dam		Mortalities[b]		Transfers[c]	
			By origin		By sex									
Period	Wild	Hatchery	Wild	Hatchery	Males	Females	Wild	Hatchery	Wild[d]	Hatchery[e]	Wild	Hatchery	Wild	Hatchery
Mar 1-15	1	3	--	--	--	--	1	--	--	3	--	--	--	--
Mar 16-31	--	22	--	--	--	--	--	--	--	22	--	--	--	--
Apr 1-15	9	50	1(1)	--	--	1(1)	7	2	1	48	--	--	--	--
Apr 16-30	20	249	2(1)	1	1	2(1)	16	1	2	247	--	--	--	--
May 1-15	10	201	1	1(1)	1(1)	1	9	4	--	195	--	1	--	--
May 16-31	45	346	5(1)	1(1)	3(1)	3(1)	39	2	1	343	--	--	--	--
Jun 1-15	40	255	5(1)	--	2	3(1)	33	1	2	254(2)	--	--	--	--
Jun 16-30	29	233	3(1)	1(1)	1(1)	3(1)	24	--	2	232(2)	--	--	--	--
Jul 1-15	53	198	5	--	3	2	46	1	2	197(1)	--	--	--	--
Jul 16-31	35	134	5(1)	--	2	3(1)	30	4	--	130	--	--	--	--
Aug 1-15	23	81	2	--	--	2	21	7	--	72(1)	--	2	--	--
Aug 16-31	16	24	3(1)	--	2(1)	1	13	4	--	20	--	--	--	--
Sep 1-15	11	13	2(2)	--	--	2(2)	9	3	--	10	--	--	--	--
Sep 16-30	11	36	2(1)	--	1	1(1)	9	7	--	29	--	--	--	--
Oct 1-15	15	50	2	--	1	1	13	9	--	41	--	--	--	--
Oct 16-31	48	115	7(1)	1	5	3(1)	40	30	1	83	--	1	--	--
Nov 1-15	52	115	6	--	2	4	45	28	1	86	--	1	--	--
Nov 16-30	28	80	6	--	5	1	22	9	--	71	--	--	--	--
Dec 1-15	7	3	1	--	--	1	6	--	--	3	--	--	--	--
Dec 16-31	7	9	1	--	1	--	5	2	1	7	--	--	--	--
Totals	460	2,217	59(11)	5(3)	30(4)	34(10)	388	114	13	2,093(6)	--	5	--	--

[a] Pre-spawning mortalities are included in the totals and listed in parenthesis.

[b] Estimate does not include pre-spawning mortalities of hatchery broodstock.

[c] Adults were transferred to Kingsley Reservoir or Taylor Lake upon first return to Powerdale Dam.

[d] Numbers include marked adults which were classified as wild adults based on scale analysis.

[e] Recycled fish returning more than three times to Powerdale Dam may be killed (i.e., depending on the condition of the fish) or transferred to either Kingsley Reservoir or Taylor Lake. The total number of adults, falling into either of these three categories, are summarized in parenthesis and included in the total number of recycled fish.

APPENDIX C

Disposition of Adult Winter Steelhead Collected at Powerdale Dam

Appendix Table C-1. Bi-weekly disposition of adult winter steelhead collected at the Powerdale Dam adult trap from the 1999-2000 run year. Counts of wild and hatchery adults may include marked and unmarked winter steelhead, respectively; origin was determined based on a combination of hatchery mark and scale analysis (*see* **METHODS**). Adult steelhead were allocated to a given category based on disposition at time of first entry to the adult trap. Adult steelhead collected for hatchery broodstock, as well as recycled adults returning to the adult trap, may subsequently have been re-released either above or below Powerdale Dam or become a mortality.

	Returns to Powerdale Dam		Broodstock collection[a]				Numbers passed above Powerdale Dam		Numbers recycled below Powerdale Dam		Mortalities[b]		Transfers[c]	
			By origin		By sex									
Period	Wild	Hatchery	Wild	Hatchery	Males	Females	Wild	Hatchery	Wild[d]	Hatchery[e]	Wild	Hatchery	Wild	Hatchery
Oct 16-31	--	1	--	--	--	--	--	--	--	1(1)	--	--	--	--
Nov 1-15	--	5	--	--	--	--	--	--	--	--	--	5	--	--
Nov 16-30	--	2	--	--	--	--	--	--	--	--	--	2	--	--
Dec 1-15	7	1	2	--	1	1	5	--	--	--	--	1	--	--
Dec 16-31	1	--	--	--	--	--	1	--	--	--	--	--	--	--
Jan 1-15	--	2	--	--	--	--	--	2	--	--	--	--	--	--
Jan 16-31	2	1	--	--	--	--	2	1	--	--	--	--	--	--
Feb 1-15	15	12	1	1	1	1	14	11	--	--	--	--	--	--
Feb 16-29	16	16	2	2	2	2	14	14	--	--	--	--	--	--
Mar 1-15	69	36	5	6	7	4	64	27	--	3	--	--	--	--
Mar 16-31	113	45	7	7	7	7	103	32	3	5	--	1	--	--
Apr 1-15	326	87	15	16(1)	14	17(1)	310	65	1	6	--	--	--	--
Apr 16-30	230	53	10	9	5	14	218	41	1	3	1	--	--	--
May 1-15	120	29	4	5	2	7	113	20	--	3	3	1	--	--
May 16-31	26	10	1	1	1	1	25	9	--	--	--	--	--	--
Jun 1-15	1	--	--	--	--	--	1	--	--	--	--	--	--	--
Totals	926	300	47	47(1)	40	54(1)	870	222	5	21(1)	4	10	--	--

[a] Pre-spawning mortalities are included in the totals and listed in parenthesis.

[b] Estimate does not include pre-spawning mortalities of hatchery broodstock.

[c] Adults were transferred to Kingsley Reservoir upon first return to Powerdale Dam.

[d] Numbers include marked adults which were classified as wild adults based on scale analysis.

[e] Recycled fish returning more than three times to Powerdale Dam may be killed (i.e., depending on the condition of the fish) or transferred to Kingsley Reservoir. The total number of adults, falling into either of these two categories, are summarized in parenthesis and included in the total number of recycled fish.

Appendix Table C-2. Bi-weekly disposition of adult winter steelhead collected at the Powerdale Dam adult trap from the 2000-2001 run year. Counts of wild and hatchery adults may include marked and unmarked winter steelhead, respectively; origin was determined based on a combination of hatchery mark and scale analysis (*see* **METHODS**). Adult steelhead were allocated to a given category based on disposition at time of first entry to the adult trap. Adult steelhead collected for hatchery broodstock, as well as recycled adults returning to the adult trap, may subsequently have been re-released either above or below Powerdale Dam or become a mortality.

	Returns to Powerdale Dam		Broodstock collection[a]				Numbers passed above Powerdale Dam		Numbers recycled below Powerdale Dam		Mortalities[b]		Transfers[c]	
			By origin		By sex									
Period	Wild	Hatchery	Wild	Hatchery	Males	Females	Wild	Hatchery	Wild[d]	Hatchery[e]	Wild	Hatchery	Wild	Hatchery
Jan 1-15	--	2	--	--	--	--	--	--	--	2	--	--	--	--
Jan 16-31	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb 1-15	1	2	1	--	--	1	--	1	--	--	--	1	--	--
Feb 16-28	7	13	2	--	2	--	5	10	--	3	--	--	--	--
Mar 1-15	52	76	8	--	6	2	43	37	1	39	--	--	--	--
Mar 16-31	145	243	23	--	15	8	120	122	1	121	1	--	--	--
Apr 1-15	321	323	43	1	22	22	274	235	3	86	1	1	--	--
Apr 16-30	384	231	41	3	19	25	342	198	--	27	1	3	--	--
May 1-15	87	53	11	--	4	7	76	44	--	9	--	--	--	--
May 16-31	19	11	1	--	1	--	18	11	--	--	--	--	--	--
Jun 1-15	--	1	--	--	--	--	--	1	--	--	--	--	--	--
Jun 16-30	1	--	--	--	--	--	1	--	--	--	--	--	--	--
Totals	1,017	955	130	4	69	65	879	659	5	287	3	5	--	--

[a] Pre-spawning mortalities are included in the totals and listed in parenthesis.

[b] Estimate does not include pre-spawning mortalities of hatchery broodstock.

[c] Adults were transferred to Kingsley Reservoir upon first return to Powerdale Dam.

[d] Numbers include marked adults which were classified as wild adults based on scale analysis.

[e] Recycled fish returning more than three times to Powerdale Dam may be killed (i.e., depending on the condition of the fish) or transferred to Kingsley Reservoir. The total number of adults, falling into either of these two categories, are summarized in parenthesis and included in the total number of recycled fish.

APPENDIX D

Estimates of Anglers and Effort (Hours Fished) in the Hood River Sport Fishery

Appendix Table D-1. Estimated numbers of anglers, hours fished, and mean hours fished in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2000.

Period	Anglers	Hours fished	Mean hours fished
Jan 1-15	259	605	2.3
Jan 16-31	438	1,009	2.3
Feb 1-15	422	1,038	2.5
Feb 16-29	398	1,015	2.6
Mar 1-15	477	1,142	2.4
Mar 16-31	760	1,803	2.4
Apr 1-15	597	1,552	2.6
Apr 16-30	788	1,715	2.2
May 1-15	817	2,393	2.9
May 16-31	630	1,647	2.6
Jun 1-15	464	1,454	3.1
Jun 16-30	399	1,131	2.8
Jul 1-15	343	790	2.3
Jul 16-31	240	390	1.6
Aug 1-15	109	168	1.5
Aug 16-31	160	370	2.3
Sep 1-15	190	419	2.2
Sep 16-30	72	181	2.5
Oct 1-15[a]	--	--	--
Oct 16-31[a]	--	--	--
Nov 1-15[a]	19	14	0.7
Nov 16-30[a]	5	5	1.0
Dec 1-15[a]	--	0	--
Dec 16-31	143	216	1.5

[a] Virtually no fishery existed during this period due to a catastrophic event on Mount Hood which sent significant amounts of sand and silt through the Hood River subbasin.

Appendix Table D-2. Estimated numbers of anglers, hours fished, and mean hours fished in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2001.

Period	Anglers	Hours fished	Mean hours fished
Jan 1-15	55	115	2.1
Jan 16-31	148	336	2.3
Feb 1-15	108	253	2.4
Feb 16-28	372	782	2.1
Mar 1-15	269	657	2.4
Mar 16-31	457	1,245	2.7
Apr 1-15	768	2,099	2.7
Apr 16-30	611	1,562	2.6
May 1-15	469	1,126	2.4
May 16-31	619	1,828	3.0
Jun 1-15	593	1,806	3.0
Jun 16-30	623	1,679	2.7
Jul 1-15	214	514	2.4
Jul 16-31	211	409	1.9
Aug 1-15	123	212	1.7
Aug 16-31	69	127	1.8
Sep 1-15	69	119	1.7
Sep 16-30	35	51	1.5
Oct 1-15	50	91	1.8
Oct 16-31	30	75	2.5
Nov 1-15	174	358	2.0
Nov 16-30	302	642	2.1
Dec 1-15	523	1,197	2.3
Dec 16-31	841	2,204	2.6

APPENDIX E

Harvest of Stray Hatchery Steelhead and Salmon in the Hood River Subbasin

Appendix Table E-1. Estimated harvest of stray hatchery adult summer and winter steelhead in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2000. Confidence limits (95%) are in parenthesis.

Period	Stray hatchery summer steelhead		Stray hatchery winter steelhead		Catch Rate
	Kept	Released	Kept	Released	(hrs/fish)
Jan 1-15	12 (10.4)	--	--	--	50
Jan 16-31	6 (6.8)	--	--	--	168
Feb 1-15	--	--	--	--	--
Feb 16-29	2 (3.1)	--	--	--	508
Mar 1-15	--	--	--	--	--
Mar 16-31	--	--	--	--	--
Apr 1-15	1 (1.2)	--	--	--	1,552
Apr 16-30	4 (7.3)	--	6 (9.4)	--	172
May 1-15	--	--	--	--	--
May 16-31	--	--	--	--	--
Jun 1-15	--	--	--	--	--
Jun 16-30	--	--	--	--	--
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Aug 1-15	--	--	--	--	--
Aug 16-31	--	--	--	--	--
Sep 1-15	--	--	--	--	--
Sep 16-30	--	--	--	--	--
Oct 1-15	--	--	--	--	--
Oct 16-31	--	--	--	--	--
Nov 1-15	--	--	--	--	--
Nov 16-30	--	--	--	--	--
Dec 1-15	--	--	--	--	--
Dec 16-31	--	--	--	--	--
Total	25 (15)	0	6 (9.4)	0	607[a]

[a] Estimate of mean catch rate is for the period 1 January - 30 April.

Appendix Table E-2. Estimated harvest of stray hatchery adult summer and winter steelhead in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2001. Confidence limits (95%) are in parenthesis.

Period	Stray hatchery summer steelhead		Stray hatchery winter steelhead		Catch Rate
	Kept	Released	Kept	Released	(hrs/fish)
Jan 1-15	--	--	--	--	--
Jan 16-31	--	--	--	--	--
Feb 1-15	--	--	--	--	--
Feb 16-28	--	--	--	--	--
Mar 1-15	--	--	--	--	--
Mar 16-31	--	--	--	--	--
Apr 1-15	--	--	--	--	--
Apr 16-30	6 (6.7)	--	--	--	260
May 1-15	--	--	--	--	--
May 16-31	--	--	--	--	--
Jun 1-15	--	--	--	--	--
Jun 16-30	--	--	--	--	--
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Aug 1-15	--	--	--	--	--
Aug 16-31	--	--	--	--	--
Sep 1-15	--	--	--	--	--
Sep 16-30	--	--	--	--	--
Oct 1-15	--	--	--	--	--
Oct 16-31	--	--	--	--	--
Nov 1-15	--	--	--	--	--
Nov 16-30	--	--	--	--	--
Dec 1-15	--	--	--	--	--
Dec 16-31	1 (1.9)	--	--	10 (14.9)	200
Total	7 (7.0)	0	0	10 (15)	222[a]

[a] Estimate of mean catch rate is for the period 16 April - 30 April and 16 December - 31 December.

Appendix Table E-3. Estimated harvest of stray hatchery jack and adult spring chinook salmon in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2000. Confidence limits (95%) are in parenthesis.

Period	Stray hatchery adult spring chinook salmon		Stray hatchery jack spring chinook salmon		Catch Rate (hrs/fish)
	Kept	Released	Kept	Released	
May 1-15	2 (4.0)	--	--	--	1,197
May 16-31	--	3 (3.9)	--	3 (3.9)	275
Jun 1-15	--	4 (4.9)	--	--	364
Jun 16-30	--	--	--	--	--
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Total	2 (4.0)	7 (6.2)	0	3 (3.9)	458[a]

[a] Estimate of mean catch rate is for the period 1 May - 15 June.

Appendix Table E-4. Estimated harvest of stray hatchery jack and adult spring chinook salmon in the Hood River sport fishery located from the mouth of the Hood River to Powerdale Dam (RM 4.5), 2001. Confidence limits (95%) are in parenthesis.

Period	Stray hatchery adult spring chinook salmon		Stray hatchery jack spring chinook salmon		Catch Rate (hrs/fish)
	Kept	Released	Kept	Released	
May 1-15	--	--	--	--	--
May 16-31	--	--	--	--	--
Jun 1-15	--	--	--	--	--
Jun 16-30	6 (7.2)	--	--	--	280
Jul 1-15	--	--	--	--	--
Jul 16-31	--	--	--	--	--
Total	6 (7.2)	0	0	0	280[a]

[a] Estimate of mean catch rate is for the period 16 June - 30 June.

APPENDIX F

Run Year Specific Estimates of Steelhead and Salmon Sport Harvest in the Hood River Subbasin

Appendix Table F-1. Estimates of summer and winter steelhead harvest[a] in non-tribal fisheries located from River Mile (RM) 0 to RM 5.0 (*see* **Methods, Harvest Estimates**) in the mainstem Hood River, by run year. Estimates of the number released are in parenthesis. Run years are bold faced for those years in which estimates of harvest are complete.

Race,[b] run year	Period[d]	Harvest[c]		
		Wild[e]	Subbasin hatchery	Stray hatchery
StS,				
1995-1996[f]	1 Jan - 30 Apr	0 (86)	30 (52)	0 (0)
1996-1997	16 Mar - 30 Apr	4 (135)	735 (187)	24 (2)
1997-1998	1 Mar - 30 Apr	0 (123)	337 (239)	30 (3)
1998-1999	1 Mar - 30 Apr	0 (81)	355 (183)	5 (0)
1999-2000	1 Mar - 30 Apr	0 (187)	224 (100)	39 (0)
2000-2001	1 Mar - 30 Apr	0 (65)	439 (86)	5 (0)
2001-2002[g]	1 Mar - 31 Dec	4 (151)	645 (152)	1 (0)
StW,				
1995-1996[f]	1 Jan - 15 Jun	0 (283)	298 (175)	12 (0)
1996-1997	1 Dec - 30 Jun	0 (206)	317 (235)	11 (0)
1997-1998	1 Nov - 30 Jun	5 (220)	231 (103)	0 (0)
1998-1999	16 Nov - 30 Jun	0 (238)	172 (113)	0 (0)
1999-2000	16 Nov - 30 Jun	3 (340)	214 (22)	6 (0)
2000-2001	16 Jan - 30 Jun	0 (329)	351 (61)	0 (0)
2001-2002[g]	1 Nov - 31 Dec	5 (221)	144 (20)	0 (10)

[a] Annual estimates of harvest, and 95% confidence limits, are presented in previous tables for the 2000 and 2001 calender years (*see* **ADULT SUMMER STEELHEAD; Harvest, Escapement, and Survival**, and **ADULT WINTER STEELHEAD; Harvest, Escapement, and Survival**) and for prior calender years in Olsen and French (1996), Olsen and French (1999), and Olsen and French (2000).

[b] StS = summer steelhead and StW = winter steelhead.

[c] Estimates of harvest include fish recycled below Powerdale Dam (*see* **Methods, Harvest Estimates**).

[d] The sampling period extends from the first bi-weekly period in which fish are first sampled in the creel to a defined ending date of 30 April for summer steelhead and 30 June for winter steelhead; unless summaries are for an incomplete run year.

[e] Estimates of wild summer and winter steelhead could include numbers expanded from adult steelhead mis-identified with respect to race.

[f] Incomplete run year. Creel was not implemented until 1 January, 1996.

[g] Incomplete run year. Estimates include harvest through 31 December, 2001.

Appendix Table F-2. Estimated number of recycled summer and winter steelhead harvested in non-tribal fisheries located from River Mile (RM) 0 to RM 4.5 (i.e., Powerdale Dam) in the mainstem Hood River, by run year. The exploitation rate is presented as a percentage of the total number recycled.

Race,[a] run year	Number of opportunities for harvest[b]	Harvest	Exploitation rate (%)
StS,			
1996-1997	55	11	20
1997-1998	202	69	34
1998-1999	1,284	107	8
1999-2000	1,138	106	9
2000-2001	3,570	166	5
2001-2002[c,d]	4,670	182	4
StW,			
1995-1996[e]	119	9	8
1996-1997	464	0	0
1997-1998	309	27	9
1998-1999	142	6	4
1999-2000	56	2	4
2000-2001	776	80	10
2001-2002[d]	1	0	0

[a] StS = summer steelhead and StW = winter steelhead.

[b] Numbers recycled represent the total count of all fish transported to the mouth of the Hood River. Individual fish may have been transported multiple times.

[c] Numbers for the 2001-2002 run year do not include numbers of recycled maxillary only clipped adults (i.e., Hood River stock summer steelhead). These adults could not be harvested in the fishery because they lacked an adipose fin clip.

[d] Incomplete run year. Estimates include harvest through 31 December, 2001.

[e] Estimates based on incomplete run year. Creel was not implemented until 1 January, 1996.

Appendix Table F-3. Exploitation rates (i.e., non-recycled adults) for non-tribal summer and winter steelhead fisheries located from River Mile (RM) 0 to RM 5.0 (*see* **Methods, Harvest Estimates**) in the mainstem Hood River, by run year. Estimates are presented as a percentage of total escapement to the Hood River subbasin.

Race,[a]	Wild		Subbasin hatchery	
run year	Kept	Released	Kept[b]	Released
StS,				
1996-1997	2	74	35 (35)	9
1997-1998	0	156	31 (39)	28
1998-1999	0	61	31 (44)	23
1999-2000	0	100	20 (37)	17
2000-2001	0	30	19 (30)	6
2001-2002[c]	1	33	21 (29)	7
StW,				
1996-1997	0	71	33 (33)	25
1997-1998	2	96	34 (39)	17
1998-1999	0	79	34 (36)	23
1999-2000	0.3	37	41 (42)	4
2000-2001	0	32	23 (30)	5

[a] StS = summer steelhead and StW = winter steelhead.

[b] The estimated exploitation rate for the combined harvest of both non-recycled and recycled adults is included in parenthesis.

[c] Incomplete run year. Estimates include harvest through 31 December, 2001.

Appendix Table F-4. Estimates of jack and adult spring and fall chinook salmon harvest[a] in non-tribal fisheries located from River Mile (RM) 0 to RM 5.0 (i.e., approximately 0.5 miles above Powerdale Dam) in the mainstem Hood River, by run year. Estimates of the number released are in parenthesis.

Race,[b] run year	Period[c]	Harvest		
		Unmarked[d]	Subbasin hatchery	Stray hatchery
SpCh,[e]				
1996	1 May - 31 Jul	52 (3)	5 (0)	0 (0)
1997	16 May - 31 Jul	40 (0)	15 (3)	6 (0)
1998	16 Apr - 30 Sep	16 (6)	3 (7)	8 (0)
1999	1 May - 15 Jul	0 (4)	0 (19)	0 (5)
2000	1 May - 15 Sep	8 (6)	20 (0)	2 (10)
2001	16 May - 15 Nov	0 (6)	54 (40)	6 (0)
FaCh,				
1996	16 Oct - 30 Nov	26 (16)	--	0 (0)
1997	1 Sep - 15 Dec	90 (132)	--	5 (0)
1998	16 Sep - 30 Sep	2 (10)	--	0 (0)
1999	16 Nov - 30 Nov	2 (2)	--	0 (0)
2000	1 Oct - 31 Dec	0 (0)	--	0 (0)
2001	1 Oct - 31 Dec	0 (2)	--	0 (0)

[a] Annual estimates of harvest, and 95% confidence limits, are presented in previous tables for the 2000 and 2001 calender years (*see* **JACK AND ADULT SPRING CHINOOK SALMON; Harvest, Escapement, and Survival, JACK AND ADULT FALL CHINOOK SALMON; Harvest, Escapement, and Survival,** and **APPENDIX E**) and for prior calender years in Olsen and French (1996) and Olsen and French (1999).

[b] SpCh = spring chinook salmon and FaCh = fall chinook salmon.

[c] The first and last days of the sampling period are based on the beginning and ending dates of the bi-weekly period in which the first and last fish, respectively, are recorded in the creel; unless summaries are for an incomplete run year or few fish were caught (i.e., primarily for fall chinook salmon).

[d] Estimates were not adjusted for unmarked stray hatchery fish. An analysis of scale samples collected from unmarked jack and adult salmon sampled at the Powerdale Dam trap indicate the percentage of unmarked stray salmon in any given run can vary widely among run years.

[e] Harvest of unmarked jacks in 1996, four year old adults in 1997, and five year old adults in 1998 may include unmarked hatchery spring chinook salmon returning from the 1993 brood release. Approximately 69% of the hatchery smolts released from the 1993 brood were unmarked (*see* **HATCHERY PRODUCTION, Production Releases**).

APPENDIX G

Summary of Injuries Observed on Summer and Winter Steelhead and Spring Chinook Salmon

Appendix Table G-1. Numbers[a] of summer and winter steelhead and spring chinook salmon with predator scars, net marks, hook scars, and scrapes, by run year. (Percentage of total sample is in parentheses.)

Species, run year	N	Predator scars	Net marks	Hook scars	Scrapes
Summer steelhead,					
1993-1994	1,356	576 (42)	206 (15)	44 (3)	383 (28)
1994-1995	1,859	803 (43)	198 (11)	66 (4)	210 (11)
1995-1996	685	186 (27)	83 (12)	15 (2)	98 (14)
1996-1997	1,553	556 (36)	175 (11)	55 (4)	164 (11)
1997-1998	679	233 (34)	83 (12)	29 (4)	70 (10)
1998-1999	699	221 (32)	72 (10)	17 (2)	61 (9)
1999-2000	674	91 (14)	35 (5)	14 (2)	57 (8)
2000-2001	1,411	307 (22)	273 (19)	43 (3)	97 (7)
Winter steelhead,					
1992-1993	650	345 (53)	43 (7)	12 (2)	62 (10)
1993-1994	581	223 (38)	23 (4)	21 (4)	62 (11)
1994-1995	317	117 (37)	8 (3)	13 (4)	57 (18)
1995-1996	560	206 (37)	21 (4)	26 (5)	88 (16)
1996-1997	930	274 (29)	20 (2)	25 (3)	79 (8)
1997-1998	620	221 (36)	17 (3)	10 (2)	33 (5)
1998-1999	624	146 (23)	12 (2)	5 (0.8)	50 (8)
1999-2000	1,226	256 (21)	47 (4)	79 (6)	108 (9)
2000-2001	1,974	324 (16)	71 (4)	55 (3)	285 (14)
Spring chinook,[b]					
1993	506	150 (30)	14 (3)	5 (1)	158 (31)
1994	300	88 (29)	13 (4)	10 (3)	54 (18)
1995	88	15 (17)	4 (5)	0	24 (27)
1996	130	13 (10)	1 (0.8)	3 (2)	9 (7)
1997	359	47 (13)	1 (0.3)	4 (1)	51 (14)
1998	100	4 (4)	0	2 (2)	11 (10)
1999	117	12 (10)	2 (2)	4 (3)	6 (5)
2000	88	10 (11)	0	1 (1)	10 (11)
2001	627	91 (15)	39 (6)	5 (1)	86 (14)

[a] Numbers for each injury type may not sum to equal the total sample size because a given fish may exhibit multiple injury types.

[b] Numbers do not include mini-jack spring chinook salmon.